EVERY MAN HIS OWN CATTLE DOCTOR.

BY

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AUTHOR OF "THE HORSE DOCTOR," "HORSE OWNER AND STABLEMAN'S COMPANION," ETC., ETC.

WITH COPIOUS NOTES, RECIPES, ETC.

AND UPWARDS OF

THREE HUNDRED AND FIFTY PRACTICAL ILLUSTRATIONS,

SHOWING FORMS OF DISEASE AND TREATMENT.

(FIFTH EDITION, REVISED AND CONSIDERABLY ENLARGED.)

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PREFACE.

In the existence of eight and a half millions of horned stock, forty millions of sheep, and five millions of pigs, worth, at a low computation, no less than one hundred and twenty millions of money, we discover ample encouragement for studying and attempting to expound means by which that as yet unparalleled mass can be caused to be as remunerative as its representative value imperatively calls for. In order to acquire an efficiency in this particular, the nature and causes of disease, as well as structure and functions of the animal body, are paramount in the curriculum, and these pave the way to a rational system of treatment and prevention. It is a field in which the scientific veterinarian is pre-eminently at home, but at present almost withheld from him. Veterinary science has ministered too little to the welfare of the nation through its valuable stock, hence scarcity of adequate help where it is most required. But the fault, as one of omission or commission, is not attributable to her. Hitherto the dogmas and traditional mystifications of the farrier, cow-leech, shepherd, and cowman have been preferred, and many proprietors at this day tenaciously cling to a principle of wholesale drugging, while a rational plan of management is totally ignored. Thus far philosophical teaching has had no part in the work it is destined to fulfil; and its professors repudiate the charge of inefficiency and want of skill brought against them, while they are unemployed, unheeded, and untested.

This state of things, however, is undergoing a satisfactory change. Laudable movements are being made, and agriculturists are to be found equally as active in their desire and efforts for an improved system as the members of our commercial community. With their sanction and encouragement, scientific teaching is persevered in, and we rejoice to witness the successful working of the scheme long ago instituted by the Royal Agricultural Society of England, viz., the establishment of a Chair of Cattle Pathology in the Royal Veterinary College, London, so ably filled by Professor Simonds, whose efforts have been unremittingly directed towards cultivating and improving the study of that branch of science which takes cognizance of the diseases of cattle, sheep, and swine.

But this is not all. The agriculturists of Britain have exhibited tokens of activity in other parts. The Highland and Agricultural Society of Scotland have also established a Chair of Cattle Pathology in the Edinburgh Veterinary College. The Royal Agricultural College at Cirencester has also paid attention to the cultivation of teaching in veterinary science, and the contagion has already been caught by the Royal Dublin Society.

Under these evidences of increasing knowledge in agricultural matters we gather encouragement, and opine that, as our members increase in scientific knowledge of the diseases of animals, the more will their talents be found serviceable and acceptable; and not the least among the principles by which that end is gained is that which conveys an accurate idea of the vast importance of the question as connected with the live stock of Great Britain.

The nature and diseases of animals have been too little understood. That which has found most favour is the assemblage of vague statements and incongruous recipes. Our best writers—and the names of Blaine, Youatt, Dick, Coleman, Clark, &c., &c., evoke from us sentiments of veneration as

pioneers in a great and glorious work—commenced a career amid a chaos of unmixed difficulties, and we marvel, not at the discrepancies that have resulted, but rather that their inculcations have been so little attended to. In following their labours, however, we work under a different dispensation, and hope to clear away a portion at least of the great cloud that has hung around so long. Our efforts, therefore, are an attempt at supplying suitable information upon the diseases of cattle, sheep, and swine, by paying particular attention to all known causes, as well as their prevention. The treatment has also met with a considerable share of attention. The advice given under this head is based on a wide experience and latest discoveries.

In addition, information has been given under the head of "*Post mortem* appearances" of animals which have succumbed to the various diseases. In this respect the Author feels that a mass of error may be swept away if those parts are carefully appealed to. It has been too much the fashion to rest satisfied with a non-professional mode of examination, and signs, greatly mistaken, have obstructed progress in the right direction. With the first death on a farm, a prompt and careful *post mortem* examination should be made by competent veterinarians, and, after learning the cause, means may be instituted to avert the occurrence of additional disaster. Such would also afford a grand impulse to scientific teaching, and do away with an unwholesome and unprofitable system of drugging.

If the veterinary surgeon were employed on account of the sound advice he can convey, the agriculturist would find it a more advantageous proceeding, and the country at large greater resources in its agricultural wealth. Veterinary science and agriculture are inseparable; the former is the handmaid to the latter. For this cause the Author has endeavoured to illustrate with truth that which has been demanded at his hands, feeling certain that to show that veterinary science is a simple matter

is to do it an injustice and the public an irretrievable wrong. The higher it can be regarded, the more valuable it must become to those who require its aid.

In the rapid strides which veterinary science has made, and for which we have to thank the efforts of the individuals and bodies already named, great improvements have taken place in the mode of treatment as well as estimate of disease. In this, as in each department comprised in the work, the Author has endeavoured to be faithful. Where his experience—gained in various parts of the United Kingdom as a practitioner, and later as a teacher of veterinary science—was found insufficient, the opinions and evidences of other authorities, British and foreign, have been cited.

The subject of contagious or Epizoötic diseases has met with an extended share of notice. In this department the author experiences a deep conviction that great evils exist, and their eradication depends as much upon a harmonious agreement as to their nature, progress, and mode of introduction, as upon the much-to-be-desired unity of acting among the agricultural body in its demands upon the Legislature. The prevalence of contagious diseases among cattle, sheep, &c., in consequence of extended commercial relations with the Continent of Europe, and our dependence upon its marvellous resources of live stock, now assumes the nature of a national calamity, the effects of which are neither quickly nor easily removed. Scarcity, famine, and fever succeed each other as inevitable results, and by them the agriculturist, who has not hitherto given his attention to the subject, may gather how much his influence, as one of a body scarcely cognizant of its power when properly directed, may minister to the welfare, comfort, and health of his fellow-creatures, as well as insuring an immunity from fell disease among his flocks and herds.

the requirements of the present day; but how far successful is left to the judgment of others. Of the numerous imperfections which, as in all human endeavours, are inevitably present, the Author is fully conscious, but he entertains the hope that they will be regarded as venial.

In the undertaking it was found impossible to dispense with many medical terms, or supply language equally as expressive, without greatly disturbing the general flow of description, adding too much, and incurring a wearisome repetition; but, in order to overcome certain inconveniences consequent thereon, a copious Glossary has been given at the end. These, with numerous additions, and illustrations taken from the Author's original drawings—for which thanks to Mr. H. Stannard and the Messrs. Dalziel—may possibly commend themselves.

G. A.

PREFACE TO THE FIFTH EDITION.

The rapid circulation of four large editions of "The Cattle Doctor" during ten years has induced the Publishers to issue the present, with considerable alterations and enlargement. Although each previous edition has, more or less, been subjected to the task of revision, it became evident that further changes were imperatively called for. With the lapse of time, improvements in veterinary as in every other science have largely taken place, following a more extended acquaintance with the

nature of the maladies of the lower animals and their treatment. This has necessitated the removal of matter contained in former editions, and the substitution of more entirely new. Several sections have been almost re-written, others largely added to, and upwards of one hundred and twenty extra engravings inserted, many of which are original, the remainder being copies generously permitted by the various authors and publishers from whose works they have been taken.

Here the Author desires to express especially his indebtedness to Dr. T. S. Cobbold and Messrs. Churchill for permission to make copies of the engravings and drawings in the valuable works, "Entozoa, or Internal Parasites of Man," and "Parasites, or Entozoa of Man and Animals," respectively; to Professor Simonds, H. M. Jenkins, Esq., and the Journal Committee of the Royal Agricultural Society of England, for the liberty of using copies from the Professor's work, "Rot in Sheep;" to Horace Cox, Esq., for the same in reference to Dr. Cobbold's smaller work, "The Internal Parasites of the Domesticated Animals," and others whose valuable contributions are acknowledged in the context. Thus enriched, the Author now submits the volume to the public, with the hope that it will receive the liberal notice with which its predecessors have been favoured, and prove eminently serviceable in the hour of need.

GEORGE ARMATAGE.

Brixton Rise, S.W.

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COLOURED PLATES.

I.—The Mouth in Epizoötic Aphtha (Or Foot and Mouth Disease) . . . . *Frontispiece.*

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SECTION I.

THE BLOOD.

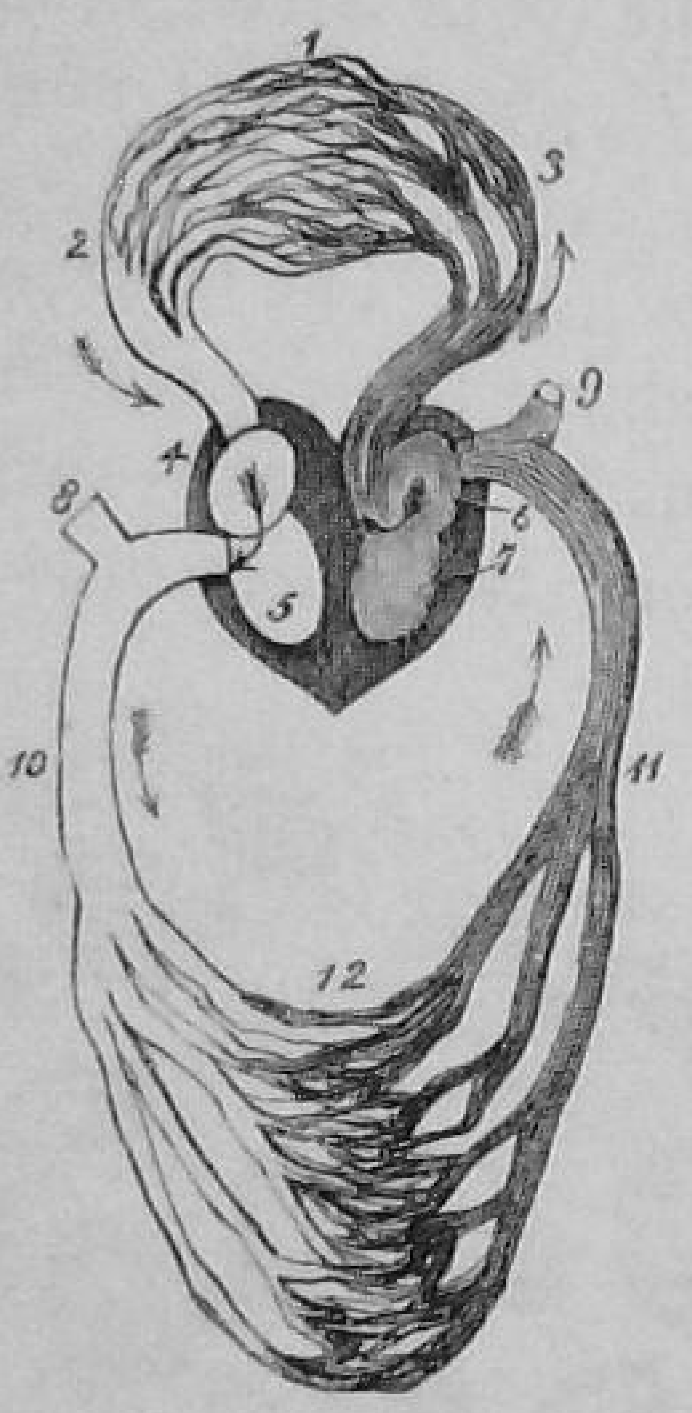
THE BLOOD.

THE blood is the coloured fluid that circulates through the whole of the body by means of appropriate vessels, carrying nourishment which it derives from certain processes that are exerted upon the food taken into the digestive organs. The properties and functions of the blood may be briefly enumerated as follows:

The CIRCULATION or MOVEMENT is designed as an effective means whereby the nutritious materials are properly conveyed to all parts, in order to nourish the various tissues and provide for their growth and maintenance. It also admits of the return to the proper centre of various useless or *effete* materials that are constantly being poured into it as a result of an incessant change or decay of the different tissues of the body. The blood, therefore, not only contains elements of nutrition, but also substances no longer useful to the system, and circulation or movement likewise facilitates and promotes their exit from the body.

The heart is the great organ of propulsion. It receives constant supplies of blood by means of a special cavity called a ventricle, on its right side, and by forcible contraction distributes it through the lungs, where, by the influence of the atmosphere in respiration, it becomes charged with oxygen, and is purified. From thence the blood returns to the ventricle on the left side of the heart, and by further contractions is distributed over the body by means of special tubes or vessels called arteries. These, by constant subdivision into numerous branches, become so small, that their diminutive size has claimed for them the name of capillaries or *hair-like* tubes, in which many important chemical and vital changes are inces-

santly going on. These are, principally, distributing nourishment and receiving the useless particles already alluded to, and from which the colour of the blood is changed from its bright and beautiful scarlet to a darker or Modena colour. Passing from these capillaries, the tubes begin to enlarge and decrease in number until, finally, the fluid reaches a main trunk of the system, called a vein, by which it returns to the heart. (Fig. 1)



1. Capillaries of the lungs.
2. Pulmonary veins.
3. ,, artery.
4. Left auricle
5. ,, ventricle
6. Right auricle
7. ,, ventricle

(4–7: of the heart)

8 & 9. Branches to the head and neck.
10. Posterior aorta
11 ,, cava.
12. Capillaries of the general surface, &c.

FIG. 1.—*Plan of the Circulation.*

DENSITY OF THE BLOOD.—The specific weight or gravity of the blood, as compared with water, varies from 1·052 to 1·057. This property is derived from the different parts that enter into its composition. The following diagram shows the condition of the blood under two aspects—circulation and coagulation :

Circulating Blood { *Liquor Sanguinis* } Serum and Fibrine } Coagulated Blood.

Circulating Blood { Blood Globules } Clot } Coagulated Blood.

(Circulating Blood = *Liquor Sanguinis* + Blood Globules; *Liquor Sanguinis* = Serum and Fibrine; Fibrine + Blood Globules = Clot; Serum + Clot = Coagulated Blood.)

In further elucidation, the following remarks are necessary: If a minute drop of blood is examined under the magnifying power of a microscope, it will be found to consist of two portions: one a solid, or apparently solid, floating in the second —a clear fluid. Under closer inspection it will be observed that the solid portion is made up of a number of separate particles called blood discs, blood particles, blood globules, &c. These vary in size in different animals, being about $\frac{1}{4000}$ of an inch in diameter in the ox or horse; in the dog they vary from $\frac{1}{3500}$ to $\frac{1}{3200}$; in the elephant, $\frac{1}{2745}$; musk deer, $\frac{1}{2325}$; dromedary, $\frac{1}{5921}$; goat, $\frac{1}{6400}$; reptiles from $\frac{1}{1231}$ to $\frac{1}{1400}$; fishes, $\frac{1}{2461}$ to $\frac{1}{1143}$; birds, $\frac{1}{1649}$ to $\frac{1}{2866}$. The thickness is about one-fourth of their width. In shape these globules are flat and circular, with some exceptions in mammals—hence their name, blood discs (Fig. 2). Among the lower order of animals they are

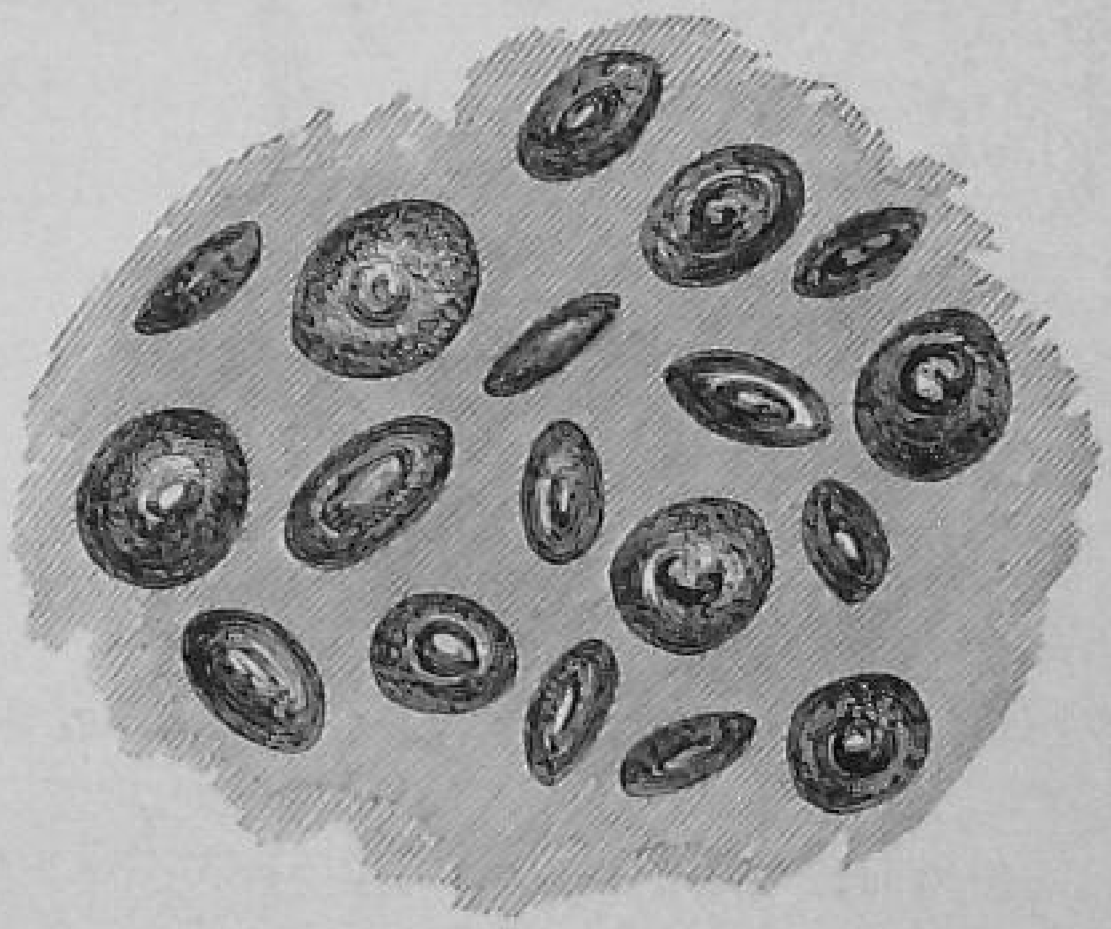


FIG. 2.—*Blood Discs or Red Globules.*
Enlarged View. Natural size about 1-4000th of an inch in diameter.

oval, and in reptiles each disc or globule contains within itself a nucleus or secondary cell for the purpose of reproduction. Besides these coloured discs there are others (colourless globules), in the proportion of about one to thirty of the former.

The clear fluid in which the globules float is called *liquor sanguinis*, or blood liquid; it has a mucilaginous consistence, a yellow colour, and is separable into two portions outside the body—serum and fibrine, the latter of which undergoes a pro-

cess of solidification known as coagulation, and, by surrounding the blood discs, carries them down with it to the bottom of the vessel after a little time has elapsed. The fluid then appears in two parts: the *clot* or *crassamentum* at the bottom, with a clear yellow-looking fluid at the top, *serum*—the whole constituting coagulated blood.

It is not our intention here to discuss the various arguments relative to the process and cause of the coagulation of the blood. The fact of such a result being inevitable is of great importance, not only as an evidence of the effect of external causes upon it when removed from the body, but also as explanatory of morbid states *within* the organs of circulation during life—references to which will be made throughout the work. The causes of the coagulation of blood appear to be due to vital as well as chemical influences. These are, loss of the effects of living tissues and propelling action of the heart and blood-vessels, as well as the power of maintenance which is conferred upon the blood within the body; contact with foreign bodies or tissues rendered inanimate or devitalized by injury, and multiplication of such points of contact; rest, as favouring a physical separation of the heavier particles from the lighter ones; attraction of the heavier particles for each other, &c.

The *liquor sanguinis*, besides containing fibrine, also contains a principle called albumen, with water and various salts, fatty and other adventitious matters, certain gases, &c. The proportions are: of water from 730 to 815 parts in 1,000; of albumen, 6 to 9 per cent.; fibrine, 3 or 4 parts in 1,000; of fats, in accordance with the mode of feeding, 4 to 5 parts in 1,000 in the ox and calf, and 1 to 2 parts in 1,000 in the horse. Of the various salts and organic principles great variation is observed, their presence depending greatly upon the mode of life, kind and quality of food, activity of functions, &c.

In all the higher animals blood is *warm*, having a temperature which varies in accordance with the kind of animal, as well as from the vigour of vital forces within. The origin of heat is due to chemical changes that result in the blood, by

the presence of materials capable of effecting union with each other. These materials may be chemical and vital, and being brought into contact under the presence and influence of vital powers, heat is given out, just as the percussion cap is warmed after explosion by the stroke of a hammer, although both were previously cold. The temperature of the blood is a safe guide to the state of the system in general. It is communicated to the tissues as the blood flows through them, and the whole body is warmed. Decline of function, whether it arises as a result of disease, starvation, &c., is inevitably shown by decline of temperature of the blood and body as a whole. It points to an obstruction of proper nutrition—the incomplete passage of the elements of food into the blood; to an arrest of chemical and vital action; to impregnation of the blood with poisonous materials; to a want of maintaining or purifying power on the part of the blood or certain organs, &c. A proper elevation of temperature is consistent and correlative with healthy function, and the influences of disease and other actions that take place within the organism, also bring about certain elevations and fluctuations known as diurnal variations, a knowledge of which proves of very essential service to the veterinary surgeon.

The temperature of animals in health we have found as follows:*

Animals.	Average during confinement.	Average during work or at liberty.
Sheep	102° 5-10ths.	104° 5-10ths.
Lambs	Undetermined.	104 9-10ths.
Pigs	101 6-10ths.	103 2-5ths.
Oxen and cows	100 4-5ths.	101 4-5ths.
Calves and stirks	100 9-10ths.	101 9-10ths.
Dogs	99 3-10ths.	101 2-10ths.
Horses	99 2-10ths.	100 3-5ths.

* "The Thermometer as an aid to Diagnosis." London: H. Kimpton; Edinburgh: Maclachan & Stewart.

The maintenance of a proper circulation of the blood and propagation of animal temperature is of vast importance in ensuring a healthy condition. Circulation and temperature bear a certain, but by no means an invariable, relation to each other, and therefore a knowledge of the essential characters of the blood, and its connection with such vital forces as are influenced by its changes, becomes of paramount importance to all who desire to understand and treat properly the diseases of the animal body. It is, however, impossible to do more than epitomize the various portions and details of the subject

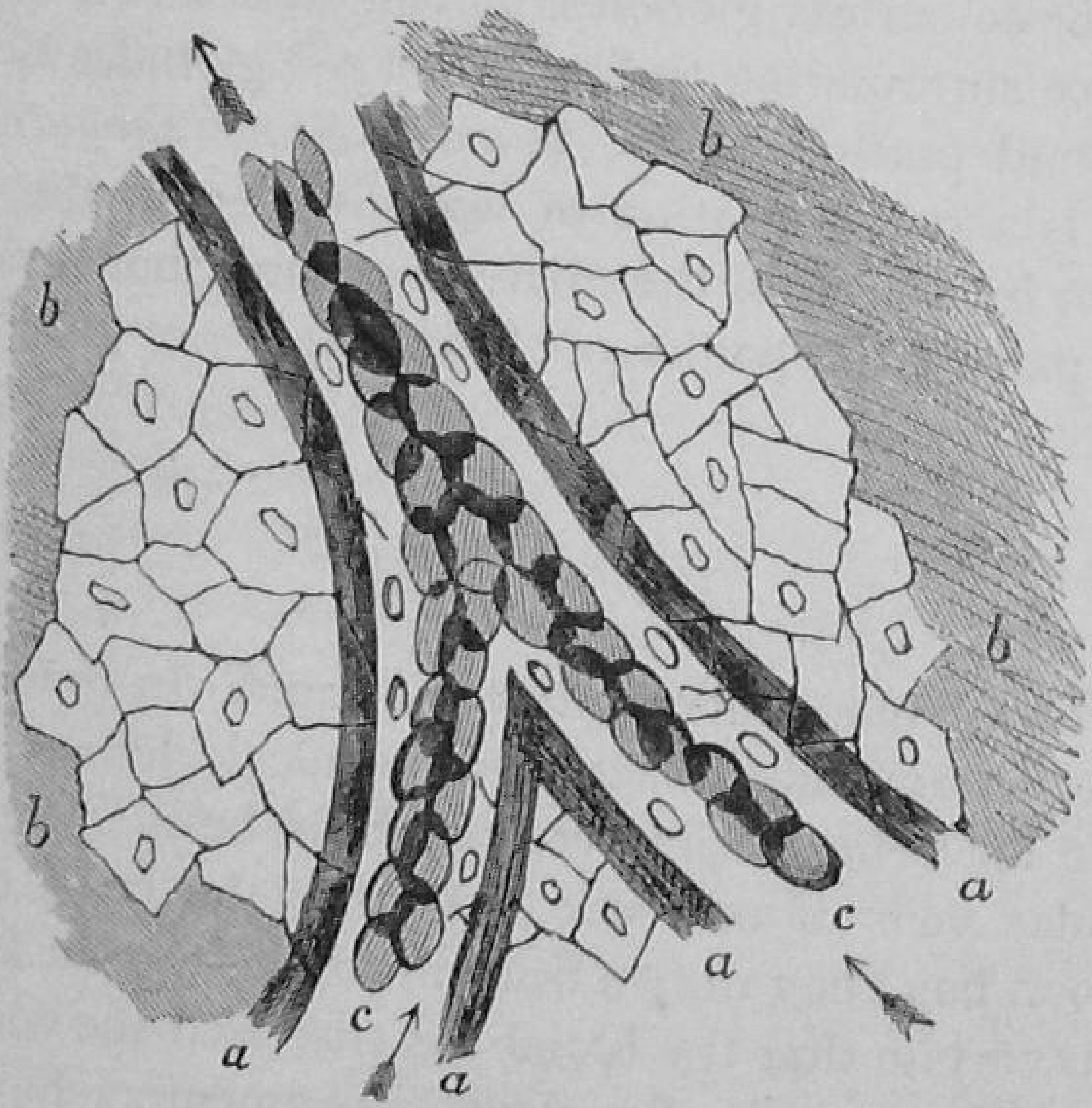


FIG. 3.—*Circulating Blood.*

in the space comprised within the limits of a volume devoted to a consideration of the diseases of cattle. We shall avoid further reference here, as it will be our imperative duty from time to time to notice important facts in connection with the function of circulation, as we discuss the morbid processes which form leading signs and conditions of the various maladies.

In the circulation of blood through the blood-vessels in health the current is very accurately regulated by means of various agencies—the elastic nature of the arteries, pressure

of surrounding tissues, force of the heart's action from behind and an aspiratory or drawing power in front, capillary attraction, consistence of the blood itself, being essential and instrumental to proper performance. In the accompanying diagram (Fig. 3) the state of healthy circulation is shown. The current of the blood is indicated by the arrows. *a a* are the walls of the blood-vessel; *b b b*, tissue, from its form and composition termed cellular, in which the vessel is embedded; *c*, the red globules, maintaining a steady and uniform current through the *centre* of the tube. Upon their outside is shown a number of white or colourless globules, moving at a slower rate. The clear space surrounding the stream of red globules is occupied by the fluid portion of the blood — *liquor sanguinis*. The drawing is a representation of what is seen in the web of a frog's foot by means of the microscope, and that which occurs in every part of the bodies of all animals.

THE PULSE.

The flow of blood is constant and rapid. In order to prove this fact, certain substances of a chemical character, and remarkable for being easily detected, have been injected within the jugular vein of one side, and after the lapse of a given time, blood has been drawn from the opposite vein for testing. It is thus certain that the blood has traversed the whole of the body, and the results of various experimenters have proved that the time occupied in the horse and ox is about 20 seconds; dog, 15; goat, 12; and the rabbit between 6 and 7 seconds.

The great agent of circulation, as we have already said, is the heart. It is a large, hollow, muscular organ, divided into separate compartments for the reception of the blood; and by alternate dilatations and contractions, assisted by valves, the current is confined to one direction. The arteries receive the blood as it leaves the heart, and the impulse arising from the pressure of an extra quantity forced into them is communicated first to the column of fluid already within the tube,

and next to the elastic walls, causing them to expand rapidly; then, by reason of their muscular contractility, the flow of blood is equalized, and the vessels return to their previous calibre. These alternate expansions and contractions are continuous, entirely in accordance with the action of the heart, and are denominated "the pulse." Without the contractions of the heart there can be no pulse, and therefore we have to learn the conditions thus exhibited by the arteries are plain indications, not only of the heart in health and disease, but of the circulation generally. The arteries in all parts of the body afford similar evidences, but those far removed, as in the limbs, do not as a rule expand immediately on the contraction of the heart as in larger trunks and those nearer to that organ. A perceptible time elapses, and the impulse is also somewhat diminished. There is no pulse in the veins, except in an instance about to be named. As the blood passes through the capillaries, which are very small and numerous, the current is less influenced by the force of the heart, the pulse is lost, and the blood returns by the veins in a steady uninterrupted flow.

The pulse is conveniently felt at the jaw. At this part the submaxillary artery comes from the inside, and winding along, passes over the lower edge of the bone, and mounts upwards on the outer side of the face, in front of the large flat muscle which closes the jaws. Here the artery of the left side is felt by means of the first and second fingers of the right hand, which are pressed upon it towards the inner side of the bone, while the thumb is placed outside, in order to maintain steady pressure. The artery of the right side may be also conveniently examined. For this purpose the examiner stands on the left side of the animal, and holds the horn with the left hand; the right is then passed over the neck to reach the jaw, the fingers and thumb being placed as just described. Sometimes the animal is masticating, when the pulse must be examined at another part. The brachial artery may be felt at a point on the inside of the forearm, below the shoulder, and nearly on a level with the elbow-joint, but in advance of it. A little practice is required to detect the vessel at this part,

but if the situation of the joint is noticed, and the vertical ridge of the arm-bone (radius) is selected as a centre, the fingers need not wander far in order to discover the pulse.

Other parts also conveniently offer the means of examining the pulse, as the fetlock-joint, where the metacarpal arteries are present, which enables the practitioner to determine the state of the circulation when cattle are lying without disturbing them, as one foot is generally extended. The facial artery may also be found a little higher than the point at which the submaxillary artery is felt at the jaw, below the eye, and behind the angle of the mouth. In some cases it is necessary for the practitioner to pass his hand up the rectum—*anus* or *fundament*—in order to examine the condition of the large abdominal and iliac arteries. Differences of calibre and obstructions to the flow of blood are significant tokens of serious damage to the hind parts.

It is not necessary to exert a great amount of pressure upon the vessel under examination. When two fingers are employed, the artery should be included in the hollow that exists between them when held together. The possibility and tendency to roll away from observation is thus lessened. Pressure should be moderate and well regulated, and the impulse is then communicated with precision and certainty.

The number of pulsations in health vary in different animals. In cattle the artery feels firm and tense beneath the finger, and the pulsations are tolerably soft and equal, with a greater duration than in the horse. In the sheep there are signs of greater activity in the beats, while the calibre of the artery is smaller and wiry in character. In pigs the pulse is hard and possesses little elasticity. The careful observer will also notice that, in addition to the special differences that exist in the pulse of each animal, the process of respiration suffers modifications, formation and other peculiarities having much to do with their production.

The circulation is most active in young animals; at middle age it is lower, and lowest of all in old age. From various

observations we are enabled to state the number of pulsations in the different animals to be as follows:

	Young Animals.	Adults.	Old Animals.
Cattle	55 to 65	45 to 50	40 to 45
Sheep	80 to 90	70 to 80	55 to 60
Pigs	100 to 110	70 to 80	55 to 60

The pulse is influenced in health by various conditions, for which very careful allowances have to be made when appealing to it as an aid to the investigation of disease. *Temperament* exerts evident effects upon the circulation. This must be admitted without reservation when is considered the fact that the heart and all the blood-vessels are under the perfect control of the nervous system. Any particular condition, therefore, attaching to the brain and spinal cord, influences the flow of blood. This will be singularly apparent on examination of the pulse of two animals, one a thoroughbred horse, the other of a heavy breed. In the former the artery will appear to bound beneath the finger, while the calibre is large and resistance proportionately great; but in the latter the artery is soft and the beats slower, and in many cases are only felt indistinctly.

The *size* of animals also ensures a modification of the pulse. All small ponies exhibit an accelerated circulation; but the differences are not so remarkable as they have been stated by writers.

Heat and want of proper ventilation have great influence upon the animal body: the nervous system is depressed, from which the arteries are relaxed, action of the heart quickened, and the pulse frequently reaches ten and even upwards of twenty beats above the acknowledged standard; but the force is materially reduced. This fact alone, securing as it does an increased amount of wear and tear of the system, besides creating an undue susceptibility to disease, should arouse the many large dairy proprietors in town and country to increased vigilance, and desire to adopt proper means for securing greater comforts to the inmates.

THE PULSE IN DISEASE.

The pulse is materially influenced by disease, modifications being the result of vital, physical, and mechanical causes. The evidences are made known in frequency and alterations of strength and regularity. Different terms are employed to denote the various kinds of pulse, the principal of which are:

1. As regards the number of pulsations in a minute, the terms *frequent* or *infrequent* are given. By frequency is implied *rapidity*. The pulse is said to be frequent or rapid when the beats, without regard to other characters, are accelerated, and consequently above the normal standard. The infrequent pulse, on the contrary, may number as many beats as the normal pulse, but usually is below it.

2. In reference to the *nature* of the pulsation as afforded by an estimate of the length of time occupied by each beat, without any reference to the time existing between them, the terms *slow* or *tardy* and *quick* are employed. The contraction of the heart is prolonged, and, in consequence, the expansion of the artery is of longer duration. The origin and termination of the beat is plainly evident to the finger, and the pulse is then denominated *slow* or *tardy*, a common result of affections of the brain. The term "quick" is too often confounded with, and substituted for, the word "frequent," an error which is fatal to all correct description, and has proved more so to the animals to which it bore reference.

3. In proportion to the amount of dilatation or expansion of the artery, in length as well as diameter, the pulse assumes the character of being *large* or *full*, and *small*.

4th, and lastly. With reference to the effects of pressure on the arterial tube, the degrees of compressibility favour the employment of the terms *hard* and *soft*.

The characters of the pulse are not always to be observed alone and in the order given; they frequently exist in combination; when terms of a double or compound nature are made use of to express the state. Thus we speak of a pulse being "full or large, hard, and frequent," or "full, soft, and slow,"

"full, soft, and tardy," "small, hard, and frequent," &c., &c. Such combinations of the original titles, with many others that are suggested to the veterinary practitioner in his daily observations, are ample for accurate description. Hitherto we have been fettered with too many terms, which, it is to be feared, have ministered to perplexity rather than to clearness and facility.

In certain diseases the pulsations exhibit great variations with respect to each other as well as to the time. A few beats succeed others very rapidly, their strength is unequal, and the time between each not the same; then comes a pause of greater or less duration; beats again succeed each other as before, and are followed by another variable pause. This is known as an *irregular* pulse.

Under other circumstances the pulsations continue with regularity but greater frequency, when suddenly the beating ceases. Such a pause may occupy as much time as three or four beats, and at the termination the pulsations are resumed with their former regularity. This is the *intermittent* pulse.

When disease continues to affect the system and weakness increases, the pulse becomes smaller, more frequent, and, after being indistinct, is altogether imperceptible, when death speedily follows. Such are the leading features of the *running down* pulse. When, on the other hand, disease declines in severity, and all the concomitant signs disappear, the pulse acquires strength and volume, it is then said to be a *rising* pulse.

We must impress upon the minds of our readers the great need of becoming acquainted with the special characters of the pulse in disease, if success is desired in the treatment of the affections of the lower animals. Too little attention has been paid to the subject in past years, and the baneful systems of bleeding, and an excessive administration of medicines, have indiscriminately increased in consequence. The pulse, although a silent monitor, yet speaks with a wonderful power, and claims to be authentic in all cases of diseased action. To disregard its teachings and warnings is equal to dealing with the animal

body as if it were an inanimate machine. If we understand them, we at once possess a power of benefiting thousands of animals and saving millions of pounds throughout the British Isles.

Venous Pulse.

The phenomenon described as the venous pulse is observed in the jugular veins upon each side of the neck. It was long regarded as an inevitable sign of some fatal malady, somewhat in the same light as palpitation in the human subject has been erroneously regarded as a constant and sure indication of heart disease. Some authorities have also declared it to consist of a "regurgitation" within the jugular veins, which but a cursory examination would have dispelled. It is well known the direction of these vessels, being from above downwards, greatly favours the descent of blood towards the heart. The impulse is, therefore, greater than probably in any other vein, and its effects must be exerted upon some part of the surrounding tissues in the event of an obstruction being brought to bear upon the flow. If the fingers are tightly pressed upon the jugular vein of one side, the vessel will be observed to fill gradually. When fully charged, imitate a tilting action with the fingers that are stopping the flow, and the whole column will be seen to move even as far upwards as the jaws. If the veins are carefully watched when a horse or cow is grazing, the same states which form the outward characters of the venous pulse will be seen in all their force, and from which those who regard the phenomenon as a result of disease, and ignore the physiological as well as anatomical peculiarities, may experience alarm and predicate wonderful appearances upon a *post mortem* examination. When an ox or cow is lying quietly in the pasture ruminating, the same effects are to be observed as a result of pressure from the contents of the abdomen upon the circulatory organs. The action of the carotid artery, which runs in company with the jugular vein, doubtless also influences the latter, and, during its pulsations, momentarily *retards* the flow in the vein. An abrupt or imperfect closure of the tri-

cuspid valves in the right auriculo-ventricular opening of the heart also exerts a similar effect; the result, therefore, is the same: the weight of the column of blood above being exerted upon the walls of the vein, causing them to expand and vibrate, developes the appearances so frequently confounded with diseased action.

There are, however, instances in which disease exists in the heart and large vessels that convey blood from it, together with emphysema of the lungs, when the blood circulates through those organs with great sluggishness, and the venous pulse is characteristic as well as continuous. To associate the venous pulse with inevitable disease, when no other signs are present, and to regard it as a reflux of blood, are errors resulting from imperfect observation. In this, as in other matters relating to the diseases of animals, too much has been accepted while proper investigation was ignored.

FEVER.

Simple or Common Fever.

This is a condition the existence of which has been denied. There are, however, ample signs which the intelligent observer will discover, if he devotes attention to a number of animals, indicating beyond all doubt that a state of fever, palpably of a simple nature, frequently exists among them.

Nature and definition.—Simple fever must not be regarded in the too common light that some potent influence is at work, and extensive disease of important organs is going on. It is purely of a transient character—a disturbance *per se*, and has been emphatically named *ephemeral fever*. The term "fever" is so generally associated with protracted or severe diseases, that alarm usually accompanies its utterance, and to this we may probably trace the cause of such a simple state being so long neglected and unobserved.

Simple or ephemeral fever is common to man and all ani-

mals as an independent affection. It may be defined as a general disturbance of circulation and the functions of the body, without the evidence or existence of disease, and as such may be known to account for signs that appear among cattle and sheep, &c. They are rapidly produced, having their origin in simple causes, are of very short duration, and thus are liable to be overlooked. From the frequent prevalence and operation of the causes, the signs are likely to become persistent, and hence arise congestions, &c., which lead to serious and fatal results.

Causes.—Inactivity, combined with a highly nutritious and stimulating food, heated atmosphere in crowded and ill-ventilated buildings, &c., a peculiar idiosyncrasy or habit of body which causes the system to become more sensible of the influence of the causes named; lastly, long journeys by road and rail, without due regard to food and comfort. Any or all of these, exerting their effects upon the nervous system and circulation, accelerate the assimilative functions by which increased temperature is produced. An accelerated circulation in the skin will probably arrest exhalation, and temperature is promoted. Other functions are similarly disturbed, and secretions checked or diverted. Such give rise to the following

Symptoms.—The pulse is frequent, and somewhat larger and harder than in health. The ears, horns, extremities, and skin generally, are warmer than natural. The mouth is hot and sometimes partially dry. Membranes of the nose and eyes somewhat higher in colour. The urine is deficient, skin dry, and probably harsh, bowels are costive, and the thermometer placed in the rectum registers 102° F. or 103° F. There are no other appearances of disorder to the ordinary observer, and even these may escape attention. Sometimes the animals are thirsty and reject a meal, but when the attendant visits them the next morning all these signs have disappeared. A change from roots to a dry diet, or *vice versâ*, may produce common fever, and likewise a journey by road, undertaken after weeks of confinement, exposure to a hot sun, change of habitation when differences exist in points of comfort, &c., &c.

Treatment must be pursued in accordance with the cause. Where irregularities exist as to feeding, housing, &c., or excesses occur in domestic treatment of any kind, they should be mitigated and improvements instituted. If a moist and highly heated atmosphere is the cause, the admission of cooler air, or a careful sponging of the body with cold water, will suffice to bring about a balance of function. Linseed-tea and bran mashes, grass, clover, roots, &c., are necessary during constipation. Medicine is not always called for, the diet above named will generally be sufficient. If, however, the signs continue, and causes are not sufficiently apparent, the system may be relieved by a draught composed of the following:

RECIPE NO. I.

Take of sulphate of magnesia (Epsom salts), or sulphate of potass	2 oz.
Powdered ginger	2 drs.

Mix and dissolve in a pint and a half of tepid water, when it may be administered. The dose may be repeated in twelve hours if necessary. Half the above quantities may be given to a calf or sheep. It may be advisable to throw up an enema or clyster of tepid soap and water. This remedy is simple, and effective under many circumstances, and in the disorder alluded to is likely to supersede agents of a more active kind.

When simple fever occurs after continued exertion, as long journeys by road and rail, there may be noticed general relaxation of the whole muscular system. The limbs are mobile and the flesh soft and flaccid; the animal declines to be roused, and lies continuously; and in addition to the signs already detailed, the pulse is frequent, small, and weak, flatus is discharged from the anus in an involuntary manner, while the muscle guarding the opening is dilated, and often insensible to stimulus. Under these circumstances great prostration is evident, and must be met by diffusible stimulants. There is a want of tone in the whole circulation and blood-vessels, and the nervous system is depressed. Local congestions are likely to occur from repeated attacks, organs become weaker, struc-

tural changes take place, and the foundation is laid for fatal or chronic disease by neglect of the conditions.

In cases of emergency, such stimulants as ale, porter, brandy, or, best of all, whisky may be given ; the malt liquors in doses of a pint or three half-pints, and of the spirits from three or four ounces to half a pint, diluted with water, to which three or four teaspoonfuls of ginger may be added. The veterinary practitioner, however, will resort to more appropriate remedies, as sulphuric ether, aromatic spirits of ammonia, as the requirements of the case are presented.

It must be borne in mind that when cattle are driven long distances, and the conditions above noted have been produced, they are not in a safe condition for slaughter. Although nothing more than a slight congestion of the lungs may have resulted, and no other structural change is present, the blood may have assumed a poisonous condition, and the flesh partaking of similar properties is unwholesome. Such animals should receive proper treatment, and be allowed a corresponding period for recruiting their strength, when after a few days the flesh becomes perfectly safe as an article of human food.

Sympathetic or Symptomatic Fever.

To an ordinary observer the conditions under this and the preceding affection are apparently analogous, and close attention and examination of surrounding agencies are required in order to pronounce correctly in the earlier stages. The important distinction of sympathetic fever is the *persistency* of the signs. They are also liable to aggravation in proportion to their duration. An ox or cow with trivial signs of disturbance consumes the evening meal, and nothing is thought of a hot mouth, &c. ; but next morning the creature is labouring under acute suffering.

Symptoms.—These are as already detailed under "Simple Fever," with the addition of intensity arising from special causes and morbid conditions. Disturbance of the respiration

is an important characteristic accompaniment, and the circulation is also variably interfered with.

Nature and Causes.—Sympathetic or symptomatic fever, as its name implies, is a morbid condition of the blood, favouring local congestions—of the lungs primarily—or disease symptomatic or characteristic, *i.e.*, dependent upon another or second disease. Thus an ox, cow, or sheep receives a puncture in some important part, as the foot, abdomen, lungs, &c., a leg is fractured, or some disease of the lungs or bowels arise, and in addition to the symptoms specially denoting them, those of severe fever are present, and are said to be in sympathy with, or symptomatic of, such affections. Symptomatic fever, then, always exists *pari passu* in company with other diseases; it is a series of additional signs by which their presence is detected and intensity estimated; and while it may not always awaken a just sense of alarm, it nevertheless calls for prompt and well-directed measures.

Treatment.—In the absence of authentic information as to the cause and existence of contemporaneous affections, treatment for symptomatic fever alone is not likely to prove successful, as it cannot consist of any measures but those already advised for simple fever. The exact cause must be clearly made out, and special treatment instituted for it, details of which will be found under the respective heads.

INFLAMMATION.

Every part of the body known as organized material—*i.e.*, having special sources of nutrition and nervous sensation, &c., as determined by the presence of blood-vessels and nerves within its substance—is liable to the process known as "inflammation." Hoof, horns, hair, teeth, feathers, wool, down, claws, nails, &c., are excluded from this category. They are nerveless and bloodless. They are *organic products*, but *not organized* structures.

Nature and definition.—This is a point that has perplexed

many, and opinions are not at all unanimous with reference to it. By some it is regarded as a result of plethora or excess of blood, while others regard it as an effect of morbid depression leading to a local accumulation. It is only by a comprehensive acquaintance with the laws of physiology that we can arrive at a satisfactory conclusion as to the nature of inflammation. It would also be impossible to discuss the point at length here, but sufficient for all practical purposes, and consistent with the object we have in view, will be gathered from the following remarks.

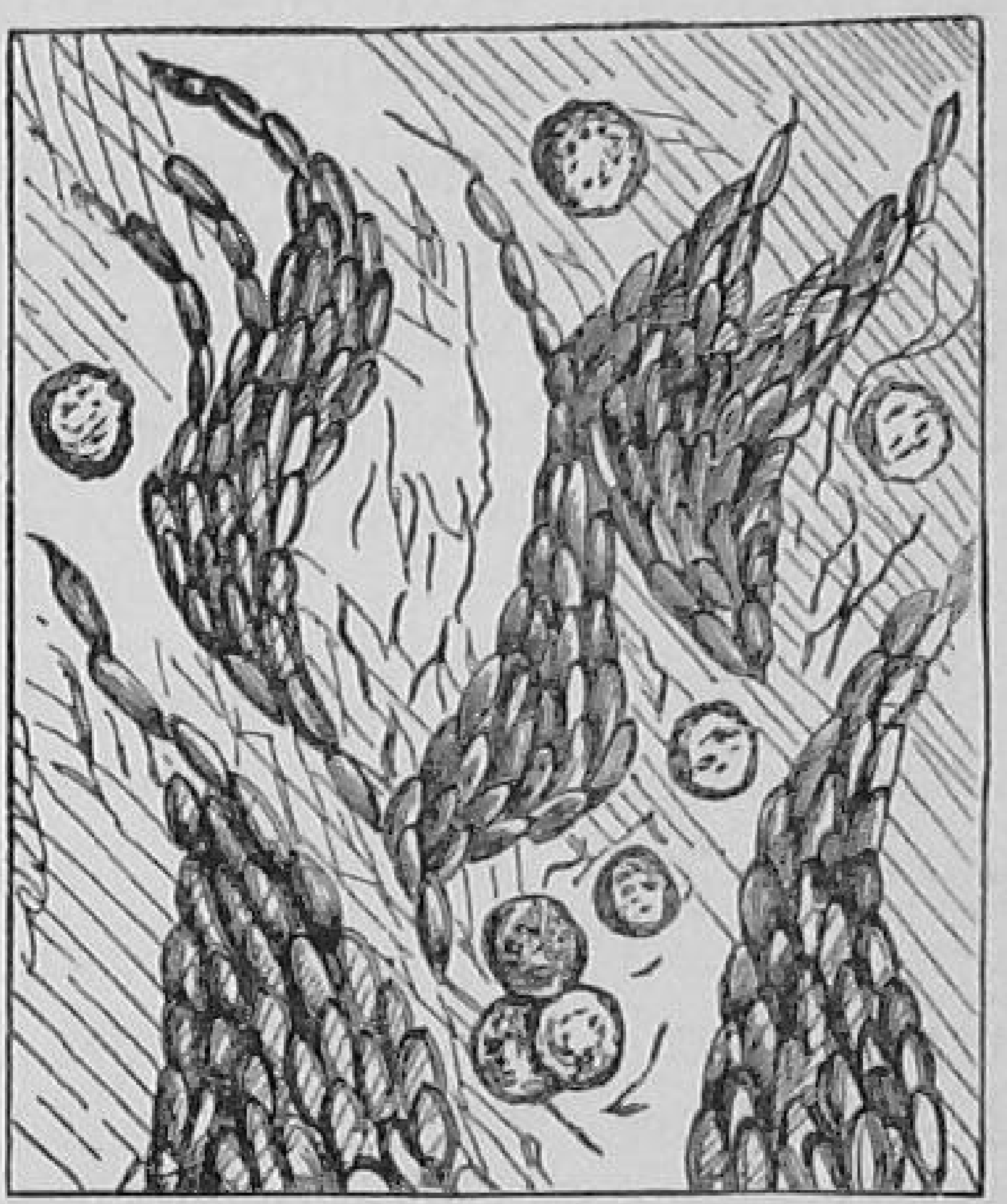


FIG. 4 —*Blood in a state of Inflammation.*
The appearances presented under the microscope.

By a reference to the illustration and description given at page 5, it will be observed that in circulating blood the central line of the current is composed of red globules or blood discs, moving freely upon and over each other. There is no disposition to assume awkward shapes and block up the vessels; on the contrary, they are perfectly elastic, and with the utmost willingness become wider or longer, or are pressed into much smaller compass to enter smaller vessels. The influence of living tissues, as derived from the nervous system, appears most probably a predominant and essential condition; but when from any cause that influence is withdrawn, the order,

precision, and certainty of the flow is disturbed or totally arrested. The blood-vessels relax and no longer maintain their controlling power. The blood globules have lost their disposition to flow on harmoniously under all conditions, regardless alike of pressure from behind or from each other, size of vessels, or the peculiarities of shape their neighbours choose to assume. They now throw aside the discoidal or circular form peculiar to man and the higher animals, become elongated, attract each other, and resolve to assist in a general obstruction. Their sides present surfaces by which they adhere to each other or to the walls of the vessels, and the appearances presented are after the form given in Fig. 4.

Inflammation, from whatever cause, is essentially the same. Neither does locality or nature of tissue bring about any specific kind of inflammation. The *effects* or *results* of the process, however, may be various.

The constituents of the blood also undergo an alteration during the inflammatory process. This is particularly noticed in reference to fibrine and red and white corpuscles. Doubtless the influence exerted by the original cause of the inflammatory attack upon the nervous system has much to do with the augmentation that has been noticed in accelerating the assimilative process, as we find that an increased general temperature (the result of an augmented combustion) is always present. Blood drawn from patients suffering from extensive inflammation has, therefore, a peculiar property of firmly coagulating. The contraction is greater than in health, and this causes the whole to separate into two unequal parts, the solid portion being in excess of the fluid. In addition, also, from excess, the solid parts, particularly fibrine, assume a *buffy* appearance upon the upper surface, which is somewhat *cupped* or hollow—conditions pre-eminently due to the power and amount of contractility which the mass possesses; descent being greatest in the centre of the vessel, while adherence to the sides retards contraction, and that part of the mass descends the least. The cupped appearance of coagulated blood is closely represented by solid fats that have been melted and

poured into earthen vessels. If the surface is examined when the mass has cooled, it will be found to be lowest in the centre, but highest round the edges, or at the inner circumference of the vessel, where the surface of the walls present greater attraction than occurs at the centre.

The *buffy coat*, then, is the yellowish colour presented by an unusual amount of fibrine, and the cupped appearance also of the upper surface is due to the same cause, which involves a firmer coagulation than in a usually healthy condition. These states are looked upon by the uninitiated as infallible evidences of inflammation, and many erroneous steps in practice are fostered and justified by the belief. Other conditions besides disease, we now are well assured, give rise to similar states, and, unless they are accompanied by additional signs, really prove nothing of an alarming character.

Inflammation, as regards its position, is of two kinds, viz., *local*, and *general* or *diffuse*. In the first we recognize the action as being confined to the blood-vessels of one particular and small part of the animal body; the second is understood to comprise acute febrile action, the result or signs of inflammation in large and important organs, as the bowels, womb, &c., including, of course, also the process within the latter.

As to character, inflammation is also regarded under two aspects: *acute* or *sthenic* and *chronic* or *asthenic*. In the former we observe the tendency to progress with great activity and vigour; the nature of soft parts, as muscle, &c., from its elaborate organization, being eminently favourable to the process. Chronic or asthenic inflammation, on the other hand, is slow and tardy, by which much destruction of tissue invariably occurs, and reparation of the parts is attended with difficulty, and sometimes rendered impossible.

Inflammation as to kind is also known under various subordinate terms; thus, the rheumatic and scrofulous forms, &c., &c., are known as *specific*; when only the ordinary phenomena are observed, it is called *common*; when the disposition is locally to form tumours and abscesses, the term *phlegmonous* is applied; while another form having no such tendency, but

affecting the skin and subjacent tissues, is known as *erysipelatous* inflammation.

Symptoms of Inflammation.—The physical appearances of inflammation are *heat, pain, redness*, and *swelling* or tumefaction. These are for the most part less easily demonstrated in the lower animals than in man. A few brief remarks on the several heads are necessary.

Heat.—Of the various signs that wait upon the process of inflammation, probably none are as remarkable as heat—animal temperature. It makes little difference whether the morbid action is local or general, it is always accompanied by an elevation of temperature in the part, and in nearly every instance also by similar evidences throughout the system. The source of increased heat in these cases is exactly the same as under healthy conditions of the system, the process being accelerated *generally* by influence upon the assimilative functions through the nervous system, and *locally* by the same process, as well as an increased quantity of blood being *in* the part—increase or activity of assimilation and the presence of blood material being, as already explained, productive of animal heat. During inflammatory action of an extensive character the thermometer proves a safe guide to the *amount* or *intensity* of the same, which is demonstrated by placing it upon the part if externally situated, or within the rectum in general cases.*

Pain is the result of pressure. Under the effects of an increased quantity of blood in the part, blood-vessels are distended, and the nerves, already acutely sensitive through influences of a morbid chararter, are suffering from that pressure. The sensation becomes doubly acute, as is evident upon the slightest touch in some animals, and continues until the morbid process is terminated. Others, however, bear pain with comparative heedlessness.

Redness.—From the great amount of covering found upon most parts of the animal body, an increase of colour is not always visible. In general inflammation, however, the mem-

* *Op. cit.*

branes of the eyes, nose, mouth, and vagina—hereafter called the *visible mucous membranes*—exhibit the character to the fullest extent, and which is taken as a very close approximation of what is actually going on within. The hue spoken of is that of which the blood partakes when viewed in a mass. During the distension of blood-vessels under inflammation, the increased quantity they contain is plainly visible through the walls, already become thin and transparent from stretching and internal pressure. Redness of inflammation is, then, the colour of the blood as seen through semi-transparent membranes covering the affected tissues.

Swelling.—This phenomenon is not always observed: when internal organs are affected it is impossible, except under few conditions, to discover it, and when situated locally it may be altogether hidden by the nature of the part affected or the covering that it possesses. Thus when ligament, tendon, or bone is involved, swelling is rarely noticed at the time; and when the feet are suffering from inflammation, the hoofs effectually bind down the internal structures, and prevent our observing it. Whenever it can be detected, swelling is a most incontrovertible sign, and pregnant with evidence of a most useful character.

The nature as well as cause of the swelling or intumescence consequent upon inflammation has formed, in times gone by, a subject of as much controversy as that of inflammation itself. Swelling was at one time thought to be due to distension merely of the blood-vessels. Later it was found that a great quantity of *lymph*—another term for fibrine—always existed in the neighbourhood of inflamed spots, and the cause as well as nature of the enlargement was then decided. As to the origin of the fibrine, all are not agreed. One teaches that it is a result of distension of the blood-vessels, in which their stretched walls were thought to favour the exudation or passage of lymph outwards.

There can be little doubt, we imagine, as to the source of fibrine. Seeing that it is largely present in the blood, its appearance in the substance of inflamed structures in undue

quantity is surely due to the increased activity of the capillaries, which are engaged in multiplied vital functions developing various nutrient fluids from the raw material. The dilated or distended vessels, with their walls stretched and thin by reason of the internal tension, cannot, therefore, account for the growing enlargement of inflammation any more by the exudation of their contents than by the simple previous distension of their walls. The origin of the fibrine is undoubted, and there is no need to oppose the fact of an abundant formation and exudation, both of which are consonant with health; but in this instance, extensively increased under the influence of morbid stimulus. The manufacture of fibrine and its distribution throughout the tissues under inflammation being thus reasonably accounted for, it remains now to notice certain other peculiarities by which the increasing and permanent enlargement is due, and which forms the basis of a somewhat opposite theory. In health the formation and exudation of fibrine within and around tissues for their nourishment, is constant, active, and doubtless, under some general conditions of nervous stimulus, equally as great as in local inflammations; but there are important necessary collateral states also lending their influence. By means of a set of important vessels, distributed over the entire body, and keeping company with the veins, which constitute the *lymphatic system*—lymph-vessels or absorbents—the excess of all nutrient fluids furnished by the capillaries is diligently taken up or absorbed, and conveyed back to the circulation, that is, the system of blood-vessels, and under this arrangement neither enlargement by accumulation nor loss by waste can take place. On the other hand, let the tissues be influenced by some unnatural stimulus or excitement, sufficient to induce what we term inflammation, somewhat of the following series of effects will then take place. First, an increased activity of circulation; second, increased formation of fibrine; third, distension of the blood-vessels; fourth, exudation from their walls in an increased quantity; fifth, the absorbents, at first included in the morbid stimulus, have now ceased action mainly from the pressure externally

of the exuded fluid. The swelling now goes on increasing until the process of secretion of fibrine is also arrested by the inflammation, and the products remain simply because the lymphatics are powerless to remove them.

The presence of lymph is characteristic of inflammation, and by it tissues are thickened—signs that should not be overlooked in judging of internal organs when affected. Congestion, extravasation, ecchymosis, &c., are frequently mistaken for true inflammation—a most unpardonable error, but quite common among pretenders.

Causes of Inflammation.—It is most unquestionable that the nervous system is the agency by which tissues derive that complex principle called life, and the circulation of the blood is controlled and preserved in harmony and obedience to general as well as special laws. We therefore observe as a natural sequence, that all forces, actions, or agencies, that interfere with, disturb, or destroy the harmony of nature in the animal body, do so through the nervous system; and, as far as they are productive of inflammation, are regarded as causes. For the sake of conferring distinctive characters, they may be called *mechanical*, *chemical*, and *vital*. Doubtless each produces inflammation by the same principles, but under a variety of operations, *i.e.*, by their effects upon the nervous system. Thus, mechanical irritants, as blows, friction, pressure, cuts, tears, falls, &c., &c., destroy nervous power in some particular part, and the result is that, by its withdrawal, those living tissues become as dead animal matter. Blood can no longer circulate through tubes of such character, nor with any different result than if a tube of lead or India-rubber, &c., were substituted. When chemical agents, as strong acids, the hot iron, &c., are employed, tissue is chemically destroyed or devitalized, and the same results are brought about; and in the more complex causes, termed vital, we must recognize the same effects, but refrain from broad and decisive statements as to their *modus operandi*. Thus cold, we may know, depresses and destroys the tone of nervous action; powerful poisons may do the same; want of pure air induces peculiar conditions, usually described

in one word—asphyxia. By the senses the influences at work may be accepted and even understood, but words hitherto have failed to penetrate the labyrinth, and decide in a plain form by what means they produce their effects. Life may be viewed as a collection of harmonious functions working with and for each other; and proportionate to the disturbance or arrest placed upon them, certain effects are demonstrable. One of these is inflammation, local, and, it may be, slight, or it may be general or diffuse—so extensive, that the whole functions are destroyed, and life can no longer remain. Both are processes essentially the same; the results, however, are in proportion to the disturbance.

Termination of Inflammation.—The results of inflammation are variously described as *Resolution, Effusion, Suppuration, Ulceration, Interstitial Deposition*, and *Mortification.*

Resolution is understood to be a gradual decline of inflammation within the affected part, followed by a restoration to original health and condition. Thus an eye is inflamed in consequence of a blow or entrance of a foreign body, but after proper measures are instituted, the active signs, as heat, pain, and intolerance of light, disappear, and the organ is as useful as before.

By *Effusion* we comprehend the accumulation of large quantities of fluid (serum) within closed cavities, as the abdomen, chest, and even beneath the skin, the common result of turgid vessels, the walls of which are stretched, and admit of the passage of the thin or watery parts of blood outwards.

Suppuration is the removal of the solid products of inflammation by change of constitution, the result being a creamy-looking fluid termed *pus* or *matter.* Membranes which have suffered from inflammation discharge pus from their external surfaces; but when the substance of glands, muscles, organs, &c., are seized by the process, the accumulation of pus takes place in the centre of the mass of inflammatory products (lymph, before spoken of), and this we term an *abscess.*

Ulceration may be defined as the loss of substance at a particular part, occasioned by inflammation at the circumference

cutting off nutrition. Such a condition is pronounced *unhealthy*, and is so far correct, that when parts of the body have been frequently subjected to the process of inflammation, or the system has suffered from devitalizing influences, circulation is arrested, or, undergoing inflammation around a former abscess, nutrition, in the form of pure blood, fails to reach the inner part, and no reparation takes place; on the contrary, the effect is to reduce by solution the tissues, which are removed in the form of a thin sanious discharge. *Sloughing* is an extension of the process, by which whole masses are detached without undergoing slow removal or solution.

Interstitial Deposition is the augmentation of substance within tissues as a result of inflammation. This addition, however, is not of the nature of the tissue in which it has been placed; thus, when muscles have been torn asunder, the lost substance is replaced by an unyielding and insensible, non-contractile material called condensed tissue. The muscle has, therefore, lost its power of action, more or less. When the substance of the lungs has been inflamed, the products obliterate the air-cells, and the substance assumes a state called *hepatization*; and when the outer surfaces inflame, they unite to the sides of the chest; the lymph of inflammation being the medium whereby both are produced. When the liver is inflamed, the same lymph takes the place of the bile-cells, and the partitions or *septæ* of the organ enlarge by the addition; the state is then known as *scirrhus* or *induration.*

Mortification.—This is a term that implies death of a part. It is an example of sloughing on the most extensive scale. While the latter implies the removal of parts from within other parts, mortification denotes the cutting off from circulation and nutrition of whole parts or limbs. Whenever the blood-vessels going to a part are destroyed, or the flow of blood is effectually prevented, that part dies, and separation is effected at the point where nutrition is first cut off.

Treatment of Inflammation.—The methods employed are regulated in accordance with the form presented, as well as other peculiar and surrounding circumstances. *Local inflam-*

mation, presenting comparatively feeble powers of resistance, usually retires before ordinary remedies, as cold or evaporating lotions. The object of such is to restore the tone or contractile power of the vessels, and induce a return of the circulation. With such a result the accompanying signs, as heat, pain, redness, and swelling, disappear, and resolution is said to take place. Cooling and evaporating lotions are thus constituted:

RECIPE No. 2.

Take of Goulard's Extract	4 fluid oz.
Dilute acetic acid	2 ,,
Distilled water	1 qt.

Mix together. The parts to be surrounded by a linen bandage and kept continually wet with the mixture; or it may be applied by means of a sponge or soft rag if the bandage is inapplicable.

RECIPE No. 3.

Take of muriate of ammonia	1 oz.
Muriatic acid (pure)	½ fluid dr.
Water	1 pt.

Mix, and apply as already directed.

RECIPE No. 4.

Take of muriate of ammonia, powdered	1 oz.
Dilute acetic acid	4 ,,
Spirits of wine	4 ,,
Water	1 pt.

Dissolve the ammonia in the acetic acid; then add the spirits and water, and use immediately as an ablution to the part.

RECIPE No. 5.

Take of muriate of ammonia, powdered	2 oz.
Nitrate of potash, powdered	2 ,,
Spirits of wine	8 ,,
Water	1 qt.

Mix the spirits and water together, and add quickly the powdered salts. The parts are then to be bathed *incessantly*

as long as the quantity of lotion lasts, or the necessity of the case requires.

RECIPE NO. 6.

Take of solution of the acetate of ammonia, and spirits of wine, of each	4 oz.
Water	1 pt.

Mix, and apply as stated for No. 4.

There is one great disadvantage attending the use of cold applications: if they are not continuous or incessant it is that of "making matters much worse." Their first effect is to constringe the vessels and reduce the quantity of blood within them; but if such action be not continued, the secondary result is that of *reaction,* in which the vessels dilate, and then accommodate an increased quantity of blood. The disease is thus aggravated instead of being lessened. Cold applications are most suited to sprains of ligament and tendon, and such parts of low organization as are common to the legs.

When soft parts are implicated, as large tracts of muscle, fomentations are of great service in softening and relaxing the substance, removing pressure, and restoring circulation. But even these must be persistent. No benefit can possibly accrue from the *periodical* use of hot applications. Reaction sets in as speedily after the effects of heat as of cold; therefore, when a fomentation is needed, the temperature of the water should be constant, and the application and supply unremitting. The following particulars should be carried out in a scrupulous manner.

If the injury is severe and the affected parts are large, arrangements should be made for an extensive supply of hot water. A few light rugs, &c., may be thrown over the former in the meantime. The animal being conveniently placed, one man undertakes the sole duty of applying the remedy. This is to be done by placing over the affected parts, four, five, or six thicknesses of woollen, after being saturated in the water. The pail or tub containing the fluid is placed as near as possible, that the excess running from the rugs may fall into it. The operator is supplied with hot water in regular pro-

portions, the temperatnre of which should be between 110° F. and 118° F.; and this he applies by means of a small tin bowl or earthenware cup, &c., at the top part of the rugs, in order that a continuous stream is caused to flow beneath the covering in connection with the skin. The time for such an application *will vary from one to six, eight, or ten hours, after which the parts must be well dried by cloths and light friction if possible, and subsequently well protected from evaporation and inevitable cooling by thick, warm, and dry coverings, carefully adjusted.*

Poultices are sometimes required, and when properly compounded and applied are especially serviceable in promoting suppuration and the formation of abscesses. They may be composed of bran, linseed meal, or even fine sawdust may be used for the feet, the efficacy of each depending upon the power to maintain a constant and equal temperature—cold or hot—with moisture, as may be desired. The method of applying poultices is variable, and depends greatly upon the part affected. The feet and lower parts of the extremities are conveniently placed in bags, the mixture being afterwards packed all round by the hands. Upper portions of the limbs are best enveloped in the leg of a worsted stocking, or case made of stout packsheet, each of which must be wide enough to contain sufficient mixture, the outside being well covered by several turns of an ordinary bandage. Tapes, string, and cords should be avoided, as they produce local compression and irritation. To other parts the single and double many-tailed bandages (Figs. 5 and 336) are of great service. Poultices, as commonly made and applied, are frequently very obstructive to the desired ends. When too large and heavy, great discomfort is produced in weakly animals; when applied beneath or to the side of parts affected, even slight motion and ordinary weight cause them to hang away from the skin, and by admitting air, rapid and hurtful cooling ensues. Maturation of the abscess is thus retarded, and a chronic form of inflammation takes place. Severe constitutional irritation follows: the lungs may be implicated, or, in addition to the exquisite soreness of the original

tumefaction, other swellings appear at various parts, exhibiting also uncertain progress, and not unfrequently proving fatal by subsequent discharge into some cavity or organ of the body. Under all circumstances the application of poultices should be effective and perfect; the temperature and moisture must be constantly maintained, and all such beastly concoctions as cow-dung, human excrement, &c.—the suggestions of filthy minds—scrupulously avoided if successful results are desired.

There is now manufactured a substance known as *Spongio-piline*, being a sheet of waterproof material covered on one

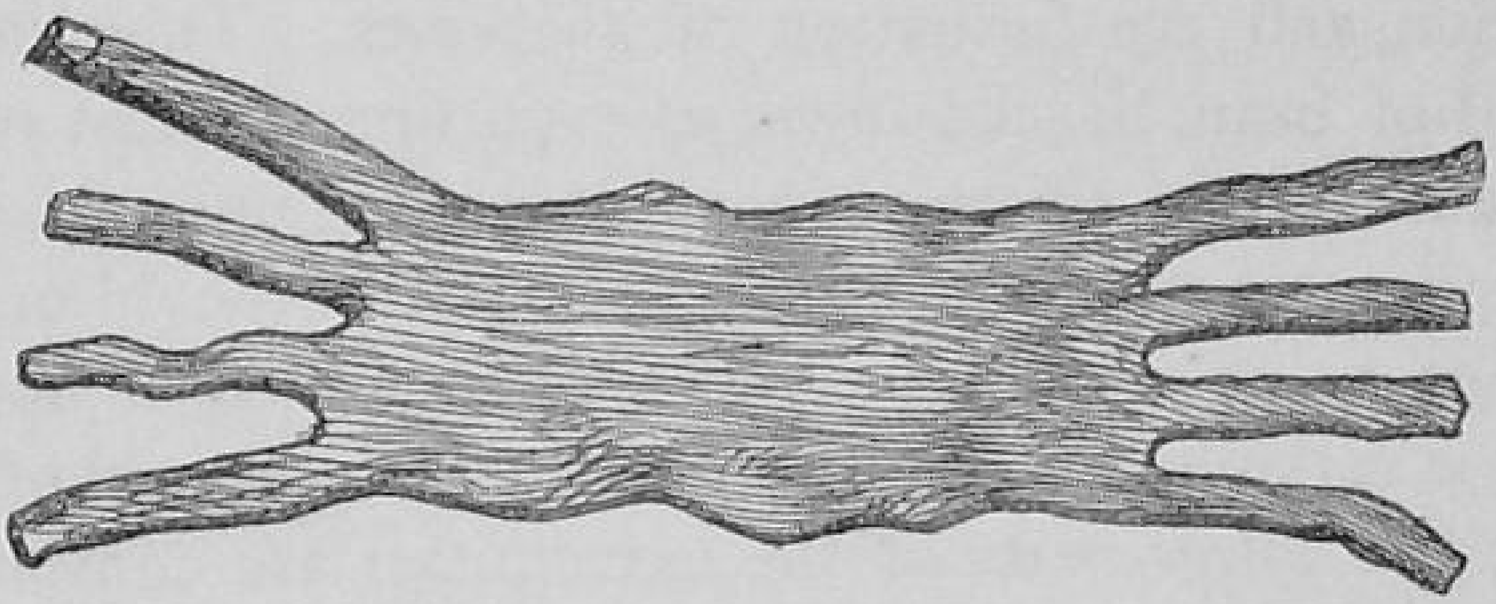


FIG. 5.—*Many-tailed Bandage.*

side by a thickness of wool. When this is cut to the proper size, dipped in hot water and applied to the part, it retains the heat and moisture for a great length of time, besides being much lighter and more comfortable than an ordinary poultice. It may be secured in position by the common many-tailed bandage (Fig. 5) according to circumstances.

Take a stout piece of calico or pack-sheet, in length sufficient to encompass the parts one and a half times; the width must be formed in accordance with circumstances. At each end an equal number of slits must be cut, by which corresponding bands or tails will be formed. The central part is to hold the application, and the bands or tails are to be tied to each other after the whole is adjusted.

Counter-irritants.—These comprise *blisters*, *setons*, *rowels*, and the *actual cautery* or *firing-iron*. In cattle practice, the first and second are principally resorted to. The third are

discarded as antiquated, unscientific, and barbarous. The last is seldom required.

Blisters are variously constituted, and are obtainable at the shops of all dealers in drugs. For ordinary purposes they are merely an admixture of powdered cantharides and lard; but other additions are made in accordance with special requirements of the case. A new vesicatory insect, the *Mylabris cichorii*, has been introduced of late years, and promises to answer many purposes, having superior properties to the old "blistering fly."

Such compounds are, however, almost useless in the ox. Pounds of cantharidine ointment might be rubbed upon the hides of cattle, and a blistering effect would be a novelty. To induce the desired action, therefore, additional ingredients of well-known power are compounded with the ordinary "fly blister" after the following forms:

Recipe No. 7.

Take of powdered cantharides	2 oz.
,, euphorbium	1 ,,
Oil of turpentine	2 ,,
,, origanum	1 ,,
Hog's lard*	16 ,,

Put the whole in a water-bath, or what answers the purpose equally as well, a clean glue-kettle, such as is used by the carpenter. Let hot water be placed in the outer vessel, and the whole kept at a point a little below boiling for eight hours; then remove, and strain through a coarse cloth by means of pressure, and set aside to cool.

Recipe No. 8.

Take of tartar-emetic	1 oz.
Hog's lard	4 ,,

Mix on a marble slab by means of a spatula. Sufficient only for present use should be made, as the compound is liable to become inactive by chemical action.

* It is necessary the lard should be perfectly free from salt.

RECIPE No. 9.

Take of the tops and leaves of savin	1 oz.
Hog's lard	2 ,,

Mix and heat in water-bath, as in Recipe No. 7.

RECIPE No. 10.

Take of croton seeds, bruised	1 oz.
Oil of turpentine...	8 ,,

Mix and set aside fourteen days, frequently agitating the mixture; afterwards filter for use.

The application of the foregoing remedies must be attended with smart friction, and a large surface should always be covered in order to secure the proper benefit from them. The proprietor, however, is warned that there is great danger to be apprehended at times from the setting in of an extreme inflammation of the skin, and subsequent sloughing. In the hands of inexperienced persons they prove sometimes sadly destructive to cattle, and therefore must be undertaken with care and consideration—or, what is better, under the supervision of a qualified veterinary surgeon. Active agents like these, applied in the form of an ointment, are also liable to be absorbed into the system, and produce all the signs of poisoning, when their application has been too extensive or continuous.

Blisters are eminently useful from their having the excellent property of *immediate action*, a great advantage when cattle are suffering from acute diseases. They should *never be applied during the first stages of severe constitutional affections.* It is only proper that the action and signs should first be subdued by powerful and appropriate internal remedies if possible, after which the full benefit of a blister will be easily developed, and the effect one of more lasting good. Blisters should *not* be applied immediately upon a part contiguous to one undergoing acute inflammation if the object is to reduce it, but at some distance. If, however, at a local point the formation of pus is required, or a slowly-forming abscess is present, then the blister should be placed immediately upon the enlarged

parts, and well rubbed in for some distance round it. When blistering ointments are used, the hair (if long) should be clipped off previously. Subsequent dressings consist of olive oil, carefully applied by means of a soft brush, but its efficacy is considerably enhanced by an addition of Goulard's Extract, in the proportion of 2 oz. to 6 oz. of oil. The mixture is well shaken, when it forms a thick creamy fluid known as *lead liniment.*

Setons.—These consist of pieces of tape passed by the aid of a proper needle beneath the skin from one point to another, in order to set up an amount of irritation, or to drain off the contents of some cyst or abscess, &c.

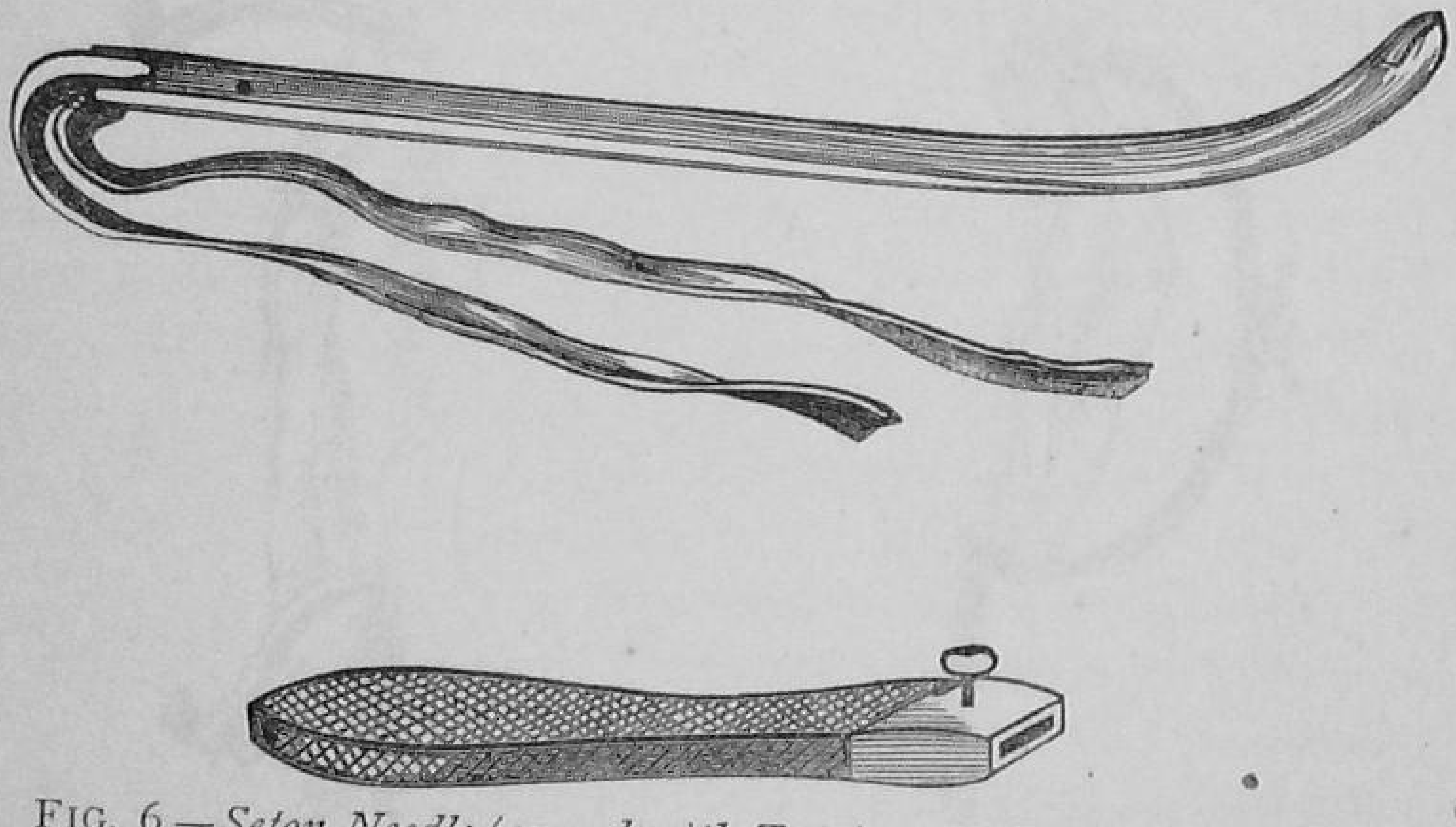


FIG. 6.—*Seton Needle (armed with Tape) and Handle for use when force is required.*

In order to prevent the seton "working out" of the orifices, it is secured in two ways: one, as in Fig. 7—both ends of the tape being brought together and simply tied in a double knot; the second, as in Fig. 8—each end being secured to a piece of wood about 2 in. long, and hollowed in the centre with the blade of a pocket-knife. When animals are loose, the first form is apt to be caught by hooks, or other projecting bodies, and torn out. The second is generally secure against such an accident.

Setons are usually smeared with blister ointment after being

inserted, in order to increase their irritant action. As a rule, they are very slow agents, and cannot take the place of a blister when activity and promptitude are required. Setons should be moved upwards and downwards each day, by which the discharge of matter may be increased and facilitated; a hot fomentation or washing daily with hot water is also frequently advisable, as accumulations and useless irritation are prevented thereby.

The object for which counter-irritants are employed in the treatment of inflammation is an endeavour to establish

FIG. 7.

FIG. 8.

a similar action in a remote part, which shall overcome or destroy the pre-existing disease, by reason of greater intensity, and having characters that may be more effectually controlled. In addition, it is believed that two diseases of equal intensity cannot exist at the same time; and, further, when the healing action of external parts, after blisters or setons have been applied, is fully established, an equal and co-existing recovery takes place in the part originally diseased. It is a bad sign when blisters do not act or rise, and setons

fail to produce a discharge. Disease is then understood to be intense, unmanageable, and fatal.

The successful treatment of inflammation by medicines is also, by similar means, that of a "derivative" character. Thus *sedatives* are used to depress or lower the heart's action; *purgatives* to divert the flow of blood towards the intestines, by *diuretics* to the kidneys, and by *diaphoretics* to the skin; besides special remedies whose action is confined to particular organs alone, or the blood, &c.

Further particulars will be given under the various heads as they appear throughout the work. Clysters, enemas, or injections, as they are variously termed, are also of great service in promoting the action of the bowels, and assisting that of purgatives. These also will be described in another part—the Dispensatory.

Abstraction of Blood.

Bleeding, or as it is variously known as *venesection*, *phlebotomy*, &c., at one time constituted the only reputable remedy for inflammatory action. In the present day, however, it is deservedly replaced by other means, and resorted to only on rare occasions by the scientific veterinarian. The locality selected for the operation also formerly was as various as the diseases for which it was proposed, and scarcely a part of the body in an aged animal could be found that had not been selected and seized upon for puncture. Later experience has determined that, if blood-letting is necessary, it should be practised in the course of the jugular vein, by which a more abundant and rapid flow is obtained, and resulting depression of the heart's action, effects that are recognized as the only means of good in the operation.

In the ox and cattle generally the jugular vein is large, and loosely situated beneath the skin and among tissues that are very mobile. It cannot, therefore, be secured by the hand alone with as much freedom as is done in the horse, neither can sufficient pressure be applied by those means. The practitioner resorts to the use of a cord about three eighths of an

inch in thickness, which he passes round the base of the neck and secures it at the top in a running noose, which can be detached in an instant by pulling one of the free ends. When

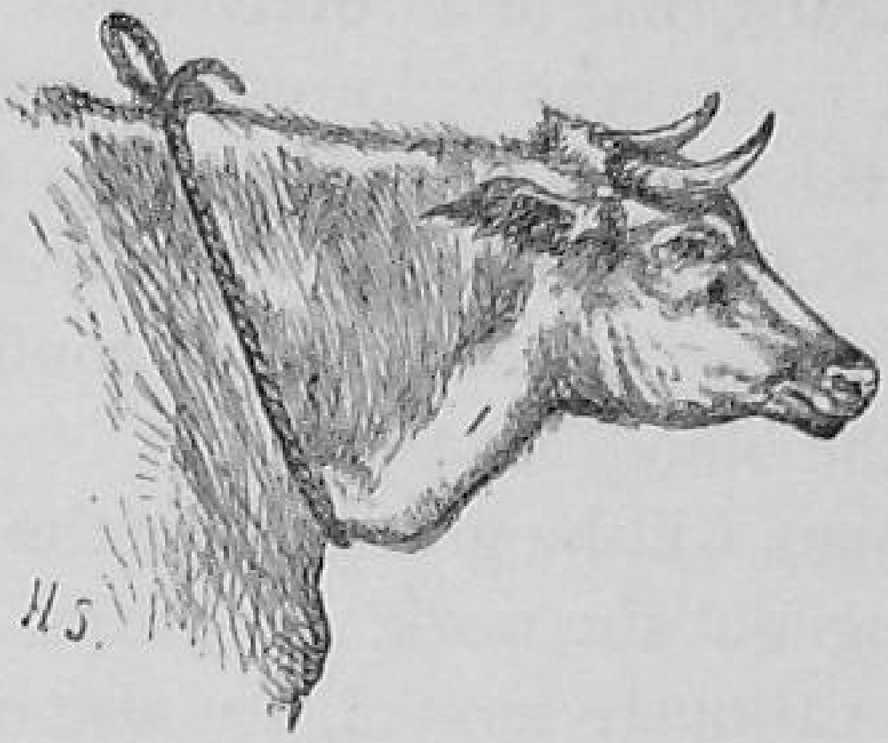


FIG. 9.—*Ox prepared for Bleeding—right side.*
The place at which the vein is opened by means of the lancet is indicated by the mark at the lower portion of the neck.

sufficient pressure is exerted, the vein will enlarge in length and breadth, and eventually assume the appearance of a large rope under the skin, as represented in Fig. 9.

The instruments employed for opening the jugular vein are the lancet and fleam. Practitioners as a rule prefer the lancet, as, all things considered, it is under more decisive control, and, therefore, less liable to danger than the fleam; but as the skin of the ox or cow over the region of the jugular vein is so much thicker and stronger in texture than that of the horse over the same parts, it is not so easily punctured, and the force required cannot be so effectively exerted as is desirable by the operator.

The lancet is, therefore, rarely employed in this department of cattle practice. To be effective the instrument should be formed after the pattern given in Fig. 10, the cutting-edge of one side being rounded, the other having a hollow curve. By this arrangement the point produced is sharper and longer than if both sides are equal, and it enters the skin more readily.

Previous to using the lancet, the hair of the spot may be smoothed down by means of a wet sponge. This will have the effect, as already named, of showing the distended jugular

vein as a large rope beneath the skin. The animal is then firmly secured by an assistant, who holds the horns, or the nose, by means of the bull-dogs. See Fig. 104. The lancet is held firmly between the thumb and forefinger of the right hand, the grasp being rendered additionally secure by closing the other fingers on the palm, and the point is directed to the centre of the vein, one of the cutting edges being towards the head, and the other towards the shoulder. In this way the edges of the blade are in the direction of the long axis of the vein, and when caused to penetrate the walls a longitudinal incision, as shown in Fig. 9, will be produced. On no account must the lancet be used across the vein, as some ignorantly suppose, as permanent injury to the vessel will ensue. Before the lancet is withdrawn, it is directed forwards and upwards, the fingers, curved as already explained, acting as the fulcrum by resting on the neck, by which means a further incision is made, and the wound in vessel and skin enlarged sufficiently to produce a satisfactory flow. At this stage the operator requires to study his attitude and position, as well as movement of the wrist. If dexterously accomplished, the stream of blood will shoot out *beneath* his hand, passing his right side, all danger of soiling the clothes or even the hands being prevented. In this outline we have represented the operator as standing on the right hand, or *off side*, of the animal, and puncturing the right jugular vein; but left-handed operators may select the left side, with equal advantages, as in cattle the sight of an eschar is not so detrimental as in the horse.

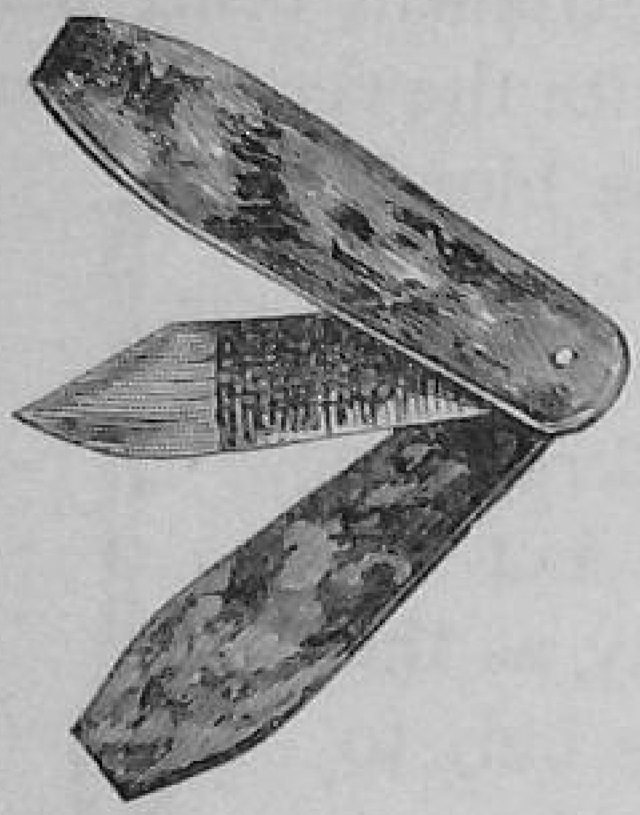


FIG. 10.—*Lancet used for Bleeding.*

In the hands of less skilful persons the fleam, Fig. 11, is the most effective means of opening the jugular vein. At the best it is a barbarous kind of instrument, and used with its companion, the bloodstick, the operation itself is as formidable as

it is horrifying to any sensitive mind. The animal is secured as already named for the first operation, but in this case the left side is chosen, and, as soon as the requisite conditions of the vein are observed, the point of the fleam is placed on the skin over the central part of the vein, the hand and instrument being held longitudinally with the vessel; then, by means of the blood-stick, Fig. 12, held in the right hand, the back of the fleam is struck rapidly and vigorously, but by no means heavily, as the force required is only to overcome the resistance produced by the distended vessel. A large and very sharp fleam should always be employed for bleeding cattle, as it is important to abstract blood abundantly and rapidly, if a desirable effect is to be produced. The position of the place of puncture on the left side, by means of the fleam, is shown in the accompanying figure.

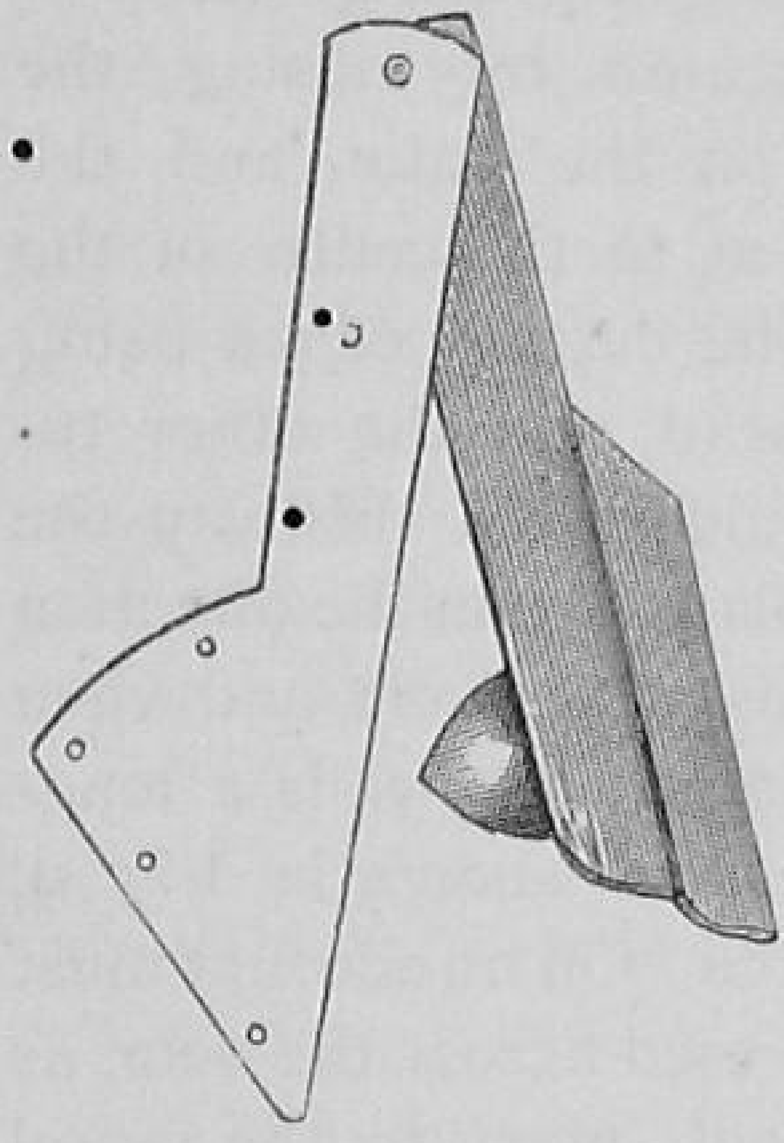


FIG. 11.—*The Fleam.*

FIG. 12. *Blood-stick.*

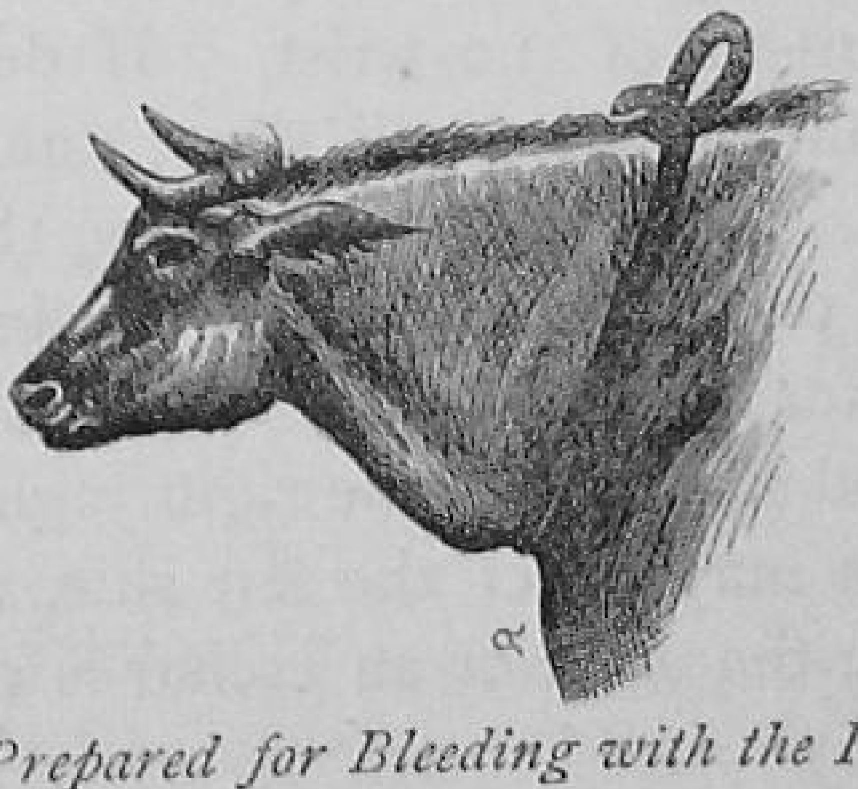


FIG. 13.—*Ox Prepared for Bleeding with the Fleam—left side.*

As soon as the requisite amount of blood has been abstracted the cord is removed, when the flow ceases. The next step is to close the wound by the common twisted suture.

This is done by passing a pin through the lips of the orifice, *in the skin only, and at the centre*, and winding round it soft twine or tow in the form of a figure 8, as shown in the accompanying illustration.

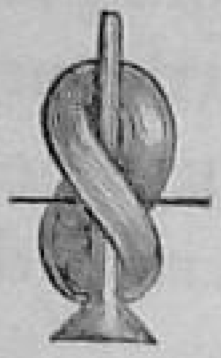


FIG. 14.—*Twisted Suture.*

There is a difficulty in causing pins to enter the strong skin of the ox, unless the points are specially prepared. This fact has induced many to adopt other means for the closing of wounds, but which, it is to be feared, possess no advantage over the old method. The author having experienced this difficulty, succeeded in preparing materials in such a manner that leaves but little to be desired. The process consists of placing the point of a common pin into one of the triangular grooves formed in a contrivance called a

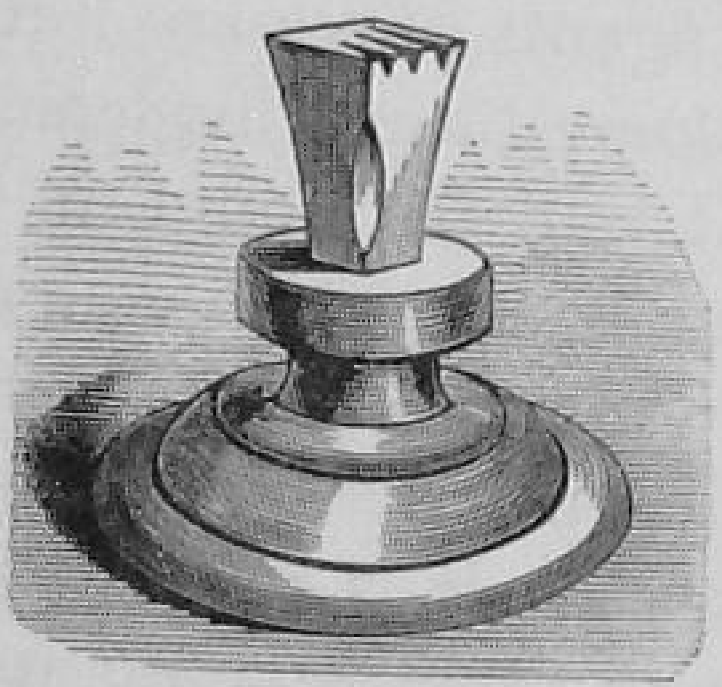


FIG. 15.—*Instrument for giving triangular points to Pins used in closing wounds after Bleeding, &c.*

"stake," as shown in Fig. 10,* and striking it with a hammer. It is then turned and struck several times, the face of the hammer producing one plane or face, while two others are formed by the sides of the groove. At the same time three *cutting* edges are produced, which exhibit a larger diameter than the pin itself, and now forms an instrument that will pass through the skin with the greatest ease.

After wounds have been closed, the points of the pins are

* Messrs. Arnold and Son, West Smithfield, have successfully carried out the directions supplied them by the Author in making this useful article.

cut off, by means of a pair of scissors having a notch cut in the blades, high up in the throat. This is a necessary proceeding in order to prevent the sutures being torn out. Some persons object to close the wound after blood-letting in cattle, urging that no bad consequences follow. This is a mistake; such do occur, although those individuals may not have observed them.

GENERAL TREATMENT OF THE PATIENT.

A WELL devised and careful system of management of animals when suffering from disease is of the utmost importance, indeed, without it the skill of the best veterinary surgeon is rendered perfectly useless. Exactly as there are properly regulated plans on which the various maladies are combated by means of medicinal agents, there are likewise equally appropriate remedies of a domestic and hygienic nature, the necessity of which is as great and important in the recovery of the patient. We shall now proceed to enumerate the latter, and discuss their relative merits in the general treatment of the sick among cattle, sheep, and swine.

House Accommodation.—It is always a useful proceeding to remove sick animals to some separate apartment or building, and in many instances it is absolutely imperative that some kind of separation is adopted, but whether the plan consists of removing the sick or the healthy ones from the building must of course depend upon the nature of the malady and surrounding circumstances. The question, as affected by the existence of contagious diseases, will be discussed at greater length hereafter; but as concerning simple diseases, the constant rule should be to remove the suffering animal (see Slaughter and Segregation).

The first and principal requirement for sick animals is pure air, as afforded by a well-drained and ventilated apartment, and as this cannot be obtained where numbers are housed, removal is necessary. It is also safer for the sound animals, as their health is frequently jeopardized by the air of the place

being tainted by the products of respiration, &c., of those diseased if they are allowed to remain — not essentially by the communication of the same complaint, but rather diseases due to blood poisoning. Fresh and pure air to sick animals is curative, and often does more than all the medicine and skill of the veterinarian, therefore, without it nine-tenths of the main remedies are wanting when pure air is absent. By fresh air we do not mean gusts or currents of wind, sometimes blowing in every direction; such may constitute ventilation in the minds of some, but it proves very uncomfortable to sick creatures, as well as harassing to the complaint. What we mean to imply is the supply of pure air without any draughts or currents, and this uncontaminated by the want of cleanliness or temporary accumulations of fæces or excrement. By drainage we simply refer to an open shallow channel conveying all fluids direct to the *outside* of the building—one that is readily cleansed; all so-called safety-traps, of which few are worth the name, being strictly confined to the yard, and at some distance from the apartment.

Where a great quantity of stock is kept it is an excellent plan to provide a place, or a number of apartments specially as boxes, stalls, or as a hospital; but when these cannot be obtained, temporary quarters may be established in a yard or pasture by means of tarpauling raised on poles or hurdles. In this way we have improvised hospital apartments far more conducive to the recovery of the sick than any substantial building to which they might have been removed. These, with the aid of clean straw, dried leaves, refuse hay, &c., as a comfortable bed and inducement to seek rest are the first items in the list, and scrupulous attention should be paid to their being kept up to the standard point of excellence, thus leaving little to be desired in the domestic department, as far as real comfort is concerned.

Warm Clothing, &c.—The real and only true source of warmth is oxygen obtained from fresh air, but as the natural functions of assimilation and aëration of the blood in sick animals are often at a discount, the necessity for some artificial

means of preserving the warmth of the body, what little there is, becomes very great. Various expedients are resorted to for this purpose, but we fear many are productive of greater discomfort than otherwise to suffering creatures. Coarse, heavy sacks, pieces of tarpauling, &c., are examples of most uncomfortable clothing, especially when damp. Besides being inadequate to cover and protect the body, they are often worse than useless, as they are constantly slipping off and exposing the skin to sudden cold. In the absence of proper rugs which may be strapped round the bodies of cattle, pieces of soft carpeting, several folds of sheeting, old blankets, &c., are useful, and when the sufferer is unable to rise, a few loose covers of the above-named materials will answer admirably if clean straw is lightly thrown over the whole of the body, leaving the head quite free. *Bandages* are sometimes used to the legs of cattle, such as are very docile, but as a rule they are productive of uneasiness to others, and are therefore resorted to only under peculiar conditions, as in injuries, &c.

The *diet* of sick animals is also of the utmost importance. It should be carefully selected and judiciously administered. A very common, but always a bad, practice consists of putting anything, or everything, that happens to be thought of, or near at hand, before the patient, which he may take or refuse. If he partakes of it, awkward results follow; and if otherwise, the mess is allowed to remain and annoy him by spoiling as it ferments under his nose. From this cause alone many animals are lost, and where, in addition, the essentials of cleanliness are absent it is surprising how animal life survives the operation of the evil influences. In every establishment where sick animals are cared for, the following should become an inflexible rule, and be indelibly fixed on the minds of those who undertake their supervision. *Prepare only a small quantity of food, which should be selected on account of its being easily digested; offer it at suitable times in clean vessels; approach the sick animal quietly, and speak softly and soothingly; if the food is taken do not interrupt by occasionally withdrawing it, or taint it by the absurd practice of stirring and mixing with the hands;*

if the offering is refused remove it entirely, do not present it a second time but offer something else. We would remind the reader that in many forms of disease the absence of appetite is conducive to recovery, and if the stomach is loaded by forced eating, or a false appetite, mischief is sure to follow. Under such circumstances the animal body is capable of being sustained for a long time without eating anything, and at no period would the consumption of food prevent his dying; it would most probably hasten his end. In some instances the animal would like to partake of food, but cannot do so from various causes; here then it is clearly our duty to assist him to receive suitable nourishment, being directed by the peculiar circumstances of the special case. Injudicious practices of the kind we have now condemned prevails too commonly, and are seldom rewarded with their just share of blame, as they are generally perpetrated by those who take no interest in the animal, or, on the contrary, are bent ignorantly on killing him with the worst form of kindness.

The following are some of the most commonly known articles of diet, and, variously prepared, may be rendered of easy digestion and prove tempting to sick animals when food can be safely administered.

In *bran* we have a most useful and simple agent for treating the maladies of stock. It is laxative, and on that account is employed for creating a mild action of the bowels. It thus suitably takes the place of nauseating medicines, and green food or roots when they cannot be obtained. The usual form is that of a mash, or simple mixture with warm or cold water as may be required, in which state it proves light, and readily passing through the bowels allays fever and thirst, and produces a comfort in disease the tendency to which other food, as grain, &c., would seriously disturb or destroy. Certain medicines in powder are conveniently given in a mash of bran, and it may properly take the place, when time will admit, of the usual food before the administration of purgative medicines, or the performance of certain particular operations. In catarrhal affections of cattle, bran, over which boiling water has been poured,

and placed in a bag held below the nostrils, proves useful in relieving the charged vessels and membranes, the steam being generated more profusely and benefically, than from water alone. The value of bran as a poultice has already been alluded to at page 32.

It is a mistake to use bran too extensively or too frequently as a sick animal's diet. It yields but little nutrition in the digestive process, and, therefore, cannot sustain life in vigour. It speedily undergoes fermentation after being moistened with water, and wooden mangers or utensils are tainted and rendered offensive to the animal. Iron or earthenware vessels are preferable as being proof against this property, and are more readily cleansed.

Linseed is a highly nutritious article of diet; besides being mucilaginous, it contains a quantity of bland oil, and acts gently on the kidneys and bowels, sheathing or covering the surfaces of mucous membranes and protecting them from irritant or corrosive substances. As a demulcent drink, commonly known as *creed linseed*, it is simply prepared by mixing in the proportion of a pound to a gallon of water, and allowing it to digest for twelve hours or more, being occasionally stirred, when the whole becomes a thick mucilaginous fluid. Half a pint or upwards of this mixture added to bran, grain, corn and chaff feed or water for drinking, renders them palatable and refreshing. *Linseed meal*, or ground linseed cake, is frequently used in the place of, or added to, bran as a poultice. It has the property of maintaining heat longer than many other substances, and probably from the presence of a small quantity of oil, soothes and softens the parts to which it is applied. Bran poultices are certainly improved by the addition of linseed meal, a more plastic mass being produced than bran alone furnishes, and which retains heat and moisture a greater length of time.

Oatmeal is a valuable article of diet, and is very usefully introduced in convalescent and other stages, when it is desirable to provide a highly nutritious and easily digested food in small bulk. It is also suitable for enriching other kinds of

food in order to coax the appetite; but its most common and extensive use is in the form of gruel, or added to water and thoroughly mixed it forms a nutritious, agreeable, and refreshing drink, readily taken by the animal in sickness or in health. When nutrition cannot be administered by the mouth, such watery mixtures of oatmeal are largely used as a clyster with useful results.

Barley and *oats*, sometimes also *beans*, *peas*, and *lentils*, are usefully alternated with each other, or variously mixed, may be used almost indefinitely as a change in the character of diet for sick animals, but more especially for those passing through the stage of convalescence. The best form in which they may be offered is after being boiled sufficiently to burst the outer husk and separated from the water. To the grain or seeds thus treated, an addition of oatmeal or linseed mucilage may be made, or the former may be supplied alone when sufficiently cool. *Malt* advantageously enters the list of the sick dietary, and is often taken when other articles of food are refused. The form used is that of mash, made by pouring warm water on the bruised or ground grain to form a moist mass. Water flavoured with ground malt is also preferred as a drink by all animals.

Among roots, *carrots*, *swedes*, and *parsnips* are almost indispensable articles of food for ailing animals. They are Nature's means of furnishing to the blood essential saline, solvent and nutritious elements, which promote its fluidity and preserve its normal condition. They likewise coax the appetite, allay fever, and produce a lax state of the bowels, these admirable properties enabling them, under judicious use, to take the place of medicinal agents in many cases. Other roots and tubers also may be employed, as the *mangold*, *kohl-rabi*, and even *potatoes*, under variable circumstances, with equal benefit, it being understood that they are always carefully washed; and, sometimes in addition, as when the digestion is feeble and the strength impaired, the peel or outer skin should be removed. Mincing and pulping are also improvements in the preparation, and when these cannot be done, chopping into small diamonds

is essential, as choking under these circumstances is more likely to occur than in health. Small quantities only should be submitted to these operations, so as to provide each offering as fresh as possible. In addition to the roots and tubers, or when they could not be readily or conveniently obtained, and valuable lives were in jeopardy, the garden and store-room have been taxed in order to contribute fruits, as apples, pears, &c., all doing good service and well repaying constant trouble expended in their provision. Besides supplying the roots and tubers in the raw state, occasionally they may be boiled, and after the excess of water is removed and they are sufficiently cooled, agreeable mixtures may be prepared by adding grain, the leguminous seeds, raw or boiled, or any of the meals as suitable under the circumstances.

Green Forage, by which is implied clover, the grasses, tares, &c., are not by any means valuable as nutritious articles of diet, but nevertheless accomplish much good by means of the corrective properties they possess in common with the roots, &c. A fresh tuft of grass, clover and the like, will often tempt the most fastidious appetite, and lead the way to a consumption of more needful and nutritious articles, while beneficial effects ensue by the allaying of febrile states, and keeping up of a lax condition of the bowels, with less cost to the system than when drugs are used.

Hay-tea.—This is probably the most simple, inexpensive, the least troublesome in preparation, yet one of the most effective articles in the sick dietary. A handful of the sweetest hay is selected, and, being first twisted into a circular roll, is placed at the bottom of a clean pail, and covered with boiling water. A cloth or sack is then thrown over the pail, and the whole is allowed to stand a quarter of an hour or longer, when cold water may be added to reduce the temperature suitable for drinking. As thus made it possesses a rich and agreeable fragrance, which the sick patient is not slow to appreciate, seldom refusing to drink even a little when pure water and other preparations have been refused for some time. Oatmeal and ground malt may also be added to hay-tea, if preferred,

but as a rule we have found the simple decoction generally sufficient.

Besides hay-tea let us not omit from our list cold water. It is Nature's beverage, provided for all animal creation, and, simple as it is, a vast amount of good arises to sick creatures by their frequent sips from constant fresh supplies, whereby the parched tongue is moistened and cooled, and by that which, even in limited quantities, finds its way to the stomach and intestines, a sense of relief and comfort, as well as useful medicinal and beneficial effects, are brought about. We have frequently had cause to condemn the niggardly, or more probably the idle, practice of keeping water from sick animals. Except under very peculiar conditions, which will be hereafter pointed out, hay-tea and water should be constantly allowed.

SECTION II.

BLOOD DISEASES.

BLOOD DISEASES.

UNDER this head we have to consider a number of diseases, the existence and peculiarity of which depend upon an altered condition of the blood, having its origin in various causes, and give rise to special local manifestations which form their distinguishing characters.

In brief review of the nature and functions of the circulating fluid, it will be apparent to the careful observer that, being the means by which all the impurities and foreign or hurtful bodies are principally collected and distributed to the various organs for separation and expulsion, any interference with the functions of depurating organs will go far to deteriorate the quality of the blood, by causing an accumulation of foreign matters within it. Such are not necessarily of a poisoned character, but their presence in undue quantity, even when partaking of the nature of blood materials, may prove conducive towards a state of blood disease. A deficiency of natural qualities, as caused by imperfect assimilation, digestion, &c., also brings about opposite effects: the system cannot be nourished or the functions of life sustained, and death is as certain as in the foregoing illustration.

Again, the presence within the system of foreign materials, in the form of animal products, the result of some morbid process or secretion, may induce some peculiar action and special form of disturbance which amounts to an actual poison, and signs, local as well as general, are soon manifest, together

with certain specific characters; thus many blood poisons give rise to products which are eliminated in various forms of eruption, confined to the skin, mucous membranes, &c., or both.

Some of these, also, are further distinguished by the power those products possess, in being capable of propagating essentially the same disease in an individual of the same species, and sometimes to others of a different class altogether. Another variety gives rise to peculiar eruptions; yet the products are not capable of establishing the same disease in animals of the same species, but putrid or septic fevers—another kind of blood poisoning—are common after inoculation. Lastly, certain blood poisons give rise to extensive disturbance of the nervous system, and produce death by interfering with its control of vegetative life.

Acknowledging these characteristics, we shall attempt a classification in the following order:

I. *A.*—Blood diseases arising from an inordinate, impaired, or arrested function, sporadic and non-contagious, viz., Plethora; Anæmia; Rheumatism; Uræmia; Apnœa in lambs and sheep; Phthisis Pulmonalis; Purpura Hæmorrhagica.

B.—Blood diseases arising from the above causes, but exhibiting enzoötic, and even septic characters, viz., Arthrites, or Joint-ill in lambs and calves; Asthenic Hæmaturia, or Red Water in cows; Malignant Catarrh; Malignant Sore Throat.

C.—Diseases arising from Peculiarity of Constitution or Dietetic Errors, &c., often Enzoötic and Hereditary.

II. Blood diseases of doubtful existence, and supposed to arise from an animal poison of unknown origin, viz., Measles, Scarlatina.

III. Blood diseases arising from animal poisons having an indigenous origin, *non-contagious*, but capable of producing in other animals a fatal septic or putrid fever, and exhibiting enzoötic characters, viz.:

A.—Anthrax, or Carbuncular Fevers; Carbuncular Erysipelas; Splenic Apoplexy; Braxy in sheep; Gloss-Anthrax or Blain; Hog Cholera.

B.—Anthracoid Affections; Parturient Apoplexy; After-pains in ewes; Red Water in sheep and lambs; Blood Disease or Navel-ill in lambs.

IV. Blood diseases arising from animal poisons of unknown origin, not indigenous to British soil, highly contagious, and producing by inoculation * the *same* diseases in other animals of the same species, and constituting the class—

A.—Epizoötic diseases, viz.:

Rinderpest, or Cattle Plague.
Epizoötic Pleuro-pneumonia.
Epizoötic Aphtha.

B.—Variolous Fevers partaking of the foregoing characters except in their being chiefly sporadic, but occasionally epizoötic, viz.:

Small-pox in sheep.
Cow-pox.
Chicken-pox.

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* There are grave reasons for claiming exception in this particular with respect to pleuro-pneumonia, a septic, though not always fatal, state being induced instead of the original type of disease.

I. *A*.—BLOOD DISEASES ARISING FROM AN INORDINATE, IMPAIRED, OR ARREST OF FUNCTION, viz.:

1. Plethora.
2. Anæmia.
3. Rheumatism.
4. Uræmia.
5. Apnœa in Lambs and Sheep.
6. Phthisis Pulmonalis.
7. Purpura Hæmorrhagica.

Plethora.

The condition recognized as plethora or fullness of blood among cattle and sheep, is pregnant with great mischief to the stock-owner and breeder. By the term plethora we indicate a state of the blood in which its essential elements are present in excess; and that of "fullness," as frequently used, should be understood to apply only to "quality," for it must be sufficiently obvious that there is hardly an undue quantity. An excessive richness of the blood is a condition quite common to young and vigorously growing animals, as well as to older ones subjected to a rich diet and limited movements. The results are also materially hastened when the digestive and assimilative processes are unusually active; and when, added to these, various collateral agencies are at work which also aid in giving so much pabulum to the blood in excess of the natural requirements of the system, or beyond its powers to appropriate. It is thus the balance of function is seriously disturbed, and the necessary powers of purification are rendered incapable of removing that excess, the greater part of which, being not

sufficiently elaborated, is prone to degeneration, and thus may constitute a blood poison. The consequences of that kind of plethora, so regularly produced in our best breeding stock, are forcibly demonstrated in the enfeebled—perhaps impotent—character of the males, and the descent of disease from the females to the young stock.

Symptoms.—Rapid improvement of condition, as indicated by health and bloom, and even unusual general cheerfulness. Shortly, signs of simple fever appear and recur, but frequently attract no attention; at length, fever of a symptomatic kind ensues, and ere the lapse of many hours, the animal is either dead or suffering from some alarmingly acute disease. Under such circumstances, it is not improbable that poison is suspected and even declared, for when a *post mortem* examination is made, the appearances go far towards encouraging such an idea in untutored minds.

Medical treatment must be based in accordance with circumstances. Ordinary plethora may be combated by change of pasture, causing the animals "to work for their living" by placing them where grass is not so abundant. Those confined to the house should have a reduced and less stimulating diet, and small doses of Epsom or Glauber's Salts given—say three or four ounces every six hours, until one or two pounds have been administered. The sulphate of potash may be used under similar circumstances, or nitre may be given in half-ounce doses three times a day for two days. When cases are not so urgent, the medicines may be divided over a week. Bleeding aggravates the causes of plethora. Greater good is to be derived from a restricted and proper diet and well-selected medicines.

ANÆMIA—DEFICIENCY OF BLOOD.

When an animal suffers a continued loss of blood by slow hæmorrhage or repeated large bleedings inflicted at short intervals; when females under lactation yield excessive quantities of milk, by which the system is drained of its nutritious elements; when food is deficient or of inferior quality, and

animals suffer from protracted debilitating affections, making little progress towards recovery, the condition is recognized as anæmia—*the bloodless state.* There is a great deficiency of the red corpuscles and also of other solid constituents of the blood. It is thin or watery in appearance, and to these properties is also added a deficient circulation. The vessels become overloaded and distended; their coats are stretched and the fluid passes through, giving rise to dropsical states—chronic and passive in character—not only in the cellular spaces beneath the skin and between muscles, &c., but in the serous cavities, *e.g.*, the chest, abdomen, scrotum, &c. Besides, peculiarly morbid and intractable congestion of the lungs is common, with syncope (*fainting*), colic, chorea (St. Vitus's dance), partial paralysis, and tuberculosis (consumption).

Anæmia frequently occurs in sheep after suffering from dysentery, and in other animals by the absurd system of using too much medicine in the treatment of diseases without proper supervision. The common prevalence of this disease among sheep, especially breeding ewes, as a result of innutritious food, and the drain on the system, developes many of the leading signs observed in "liver rot." In contradistinction thereto, anæmia has been not inappropriately termed the "hunger rot."

Symptoms.—Gradual but general wasting of the whole muscular system; visible mucous membranes, as those of the eyes, nose, and mouth, &c., are pale or white; the pulsations are very weak and vibrating; calibre of the artery exceedingly small, and loud and unusual sounds are heard in the neighbourhood of the heart, which have been described as "thumping"; there is great weakness and prostration, and the appetite is deficient and capricious—*dysorexia*; if the animal is caused to move rapidly, it becomes affected with giddiness—*vertigo*; the breathing is conducted with extreme difficulty, and suffocation is threatened; the bowels are irregular, and a gurgling or rumbling noise—*borborygmus*—is heard among them almost continually, while flatus passes largely from the anus or fundament; when the animal walks, the legs cross

each other, and sometimes become fixed in such a manner that he falls, being unable to extricate them.

According to a report made by the chief inspector of stock in Queensland during 1877, there was a loss of 1,750,000 sheep arising from anæmia caused by the want of nutrition in the pasturage, which was dried up by the excessive heat. As is usual in such outbreaks, the original malady was much aggravated by the presence of worms—*entozoa.*

Treatment.—This must be regulated entirely in accordance with the causes, which should be thoroughly investigated and decided in all cases. If anæmia has arisen from profuse or protracted hæmorrhage, the flow of blood should be stayed as soon as possible. Diarrhœa or dysentery, not dependent upon any constitutional disease, must be very cautiously arrested, for which the following draught will be found beneficial.

Recipe No. 11.

Take of chloroform	2 fluid drs.
Or chloric ether	½ oz. to 6 drs.
Tincture of opium	½ oz.
Starch or flour gruel	1 pt.

Such a dose is sufficient for a moderate-sized cow, and may be repeated in twelve hours if the action of the bowels is not altered. When success follows the exhibition of the medicine, moderate doses of strychnia, gentian, with ginger, and probably iron, should be given in warm ale night and morning; and the food must be of a nutritious quality, easily digested, and supplied in small quantity at regular intervals. Hay-tea, gruel, barley-water, &c., for drink, will also be required, and the comfort of the animal must be further promoted by good beds, ventilation, and clothing, if required.

Protracted cases will call for more powerful remedies, and the exercise of skill and extreme care, for which a properly qualified veterinary surgeon is best able to advise. Simple anæmia may present no difficulty, but complicated cases which exhibit to the uninitiated no difference from the slight form, are apt to be confounded with it. The latter are rarely cured, and only detected by negative examination.

Pre-Parturient Ascites; or
Abdominal Dropsy prior to Parturition in the Ewe.

Nature and Causes.—Passive accumulation of serum in the abdomen as a result of blood degeneration originating in a too exclusive diet of turnips.

Independent of a voracious appetite which many ewes possess during the period of pregnancy, the quantity of food they will devour is surprising. When that food consists mainly of turnips, two powerful causes of disease are created, which in their operation upon the vital functions give rise to such serious conditions, that nothing less than fatal terminations can be expected. In the first place the mass of ingesta contains a vast proportion of water in comparison to the nutritious elements. This excessively dilutes the blood, and in conjunction with the absence of a sufficient quantity of nutritious elements, it is reduced beyond the power to support the demands of the fœtus and the system of the mother. Secondly, there is the extreme low temperature of the ingesta which deprives all contiguous organs, notably those engaged in digestion and assimilation, of their necessary amount of animal heat. The whole body, however, suffers more or less directly from this cause, but always in a remote or secondary degree from the arrest of nutritive function. The abdominal circulation particularly is impeded, and the relaxed vessels admit of the exudation of the watery portion of the blood.

Symptoms.—The ewe exhibits signs of the approach of the disease when tolerably advanced in pregnancy. The indications are a loss of condition or wasting of flesh, blanched membranes, weakness and exhaustion, with perceptible increase in the size of the abdomen. At first it seems distended, loose, and hangs pendulous; the flanks are also hollow, and with the loss of condition the animal looks rather woeful. As the fluid within accumulates the flanks fill, and the abdomen becomes round and tense. If pressure is exerted at two different places fluctuation will be detected, and percussion furnishes a dull or dead sound in place of the resonant or drum-like state common

to health. The animal is now said to be "pot bellied." In addition may be noticed a rough, dry, and harsh state of the wool, portions of which are already shedding; the appetite is impaired, and dyspepsia has set in; the respiration is deep and often excited, bowels irregular, and urine scanty. Swellings appear beneath the breast, abdomen, about the udder, and sometimes also in the limbs. The space beneath the jaws also exhibits the characteristic subcellular infiltration, and the ewe is then said to be "chockered." Death usually takes place one, two, or three weeks before lambing time, but some ewes may bring forth live lambs, which, however, are so weak, as well as being dropsical, that they are unable to suck, and therefore pine and die.

Post mortem Appearances.—A large quantity of thin serum occupies the abdominal cavity. An extensive infiltration is also present beneath the entire peritoneum, but especially over the intestines. The liver is usually pale and non-secreting, and the portal vessels are distended. Disease of the spleen may also exist, with or without disease of the pancreas and enlargement of the mesenteric glands. Everywhere beneath the skin fluid has accumulated, and the muscles are flabby and moist from the same cause.

Treatment as for Ascites generally. (See Section IV).

Prevention.—Substitute a less bulky, washy diet than that more or less exclusively of turnips. If the roots have been grown on poor land, and are otherwise of an inferior quality, abandon them entirely, and make judicious use of other crops. An absolute alteration in the quality of the diet must be made; but while a proportion of green food or roots is highly essential towards the preservation of health, it must be also borne in mind that dry and nutritious kinds, as grain, &c., are equally necessary. The principles which should govern the practice of feeding are those which point out the proper use of both so as to avoid the serious consequences arising from extreme or injudicious measures of any kind.

The question of exercise is one also calling for imperative attention. It makes little matter what other measures are put

into operation if exercise is neglected. Health cannot be maintained without it, and if it be withheld from breeding animals the offspring is sacrificed, or with the mother the health is at least depreciated. It must be remembered, too, that pregnant ewes, when well fed, will not voluntarily move much ; the needful exercise will not be obtained by merely turning them outside the hurdles of the fold, nor even into an adjoining pasture, especially if the food supplied in the fold is better than that to be obtained in grazing. Under these circumstances, the ewes soon learn the policy of leaving the fold with the stomach filled to repletion, and the daytime in the pasture is spent in rumination and rest. They seldom move many yards away, they simply rise to stretch and lie down again, and towards the time for re-entering the fold are closely gathered round the hurdles with appetites sharpened by a self-inflicted fast. Under these circumstances, it may be advisable to reduce both the quality and quantity of the food supplied at night, so as to ensure that during the day a certain amount of work shall be performed for the living. A more certain and efficient method consists of gently driving the sheep to a distant pasture daily. This, with careful regulations as to diet, has succeeded admirably in numbers of instances which have come beneath our notice.

RHEUMATISM—RHEUMATIC FEVER.

This is the *Felon*, *Joint Felon*, *Cold Felon*, and *Chine Felon* of the farrier and cow-leech.

Nature.—A specific condition of the blood, or constitutional disturbance, in which the whole of the body sympathizes ; but the local manifestations are confined to particular structures of the body known as the serous and fibro-serous membranes. Such are the coverings of the joints, heart, lungs, and intestines, bones, muscles, brain, spinal cord, &c. ; also the lining membranes of the heart, chest, substance of tendon and ligament, &c., &c. Rheumatism is observed in the *acute* and *chronic* forms.

Causes.—These are not well made out, but it is obvious there are agencies influencing the assimilative functions by which the poison of the disease—supposed to be lactic acid—is generated. Cold and wet do not appear to be alone the cause, but rather act as aggravations. Bad management, inducing alternate plethora and anæmia, is a fruitful source in sheep as well as cattle, the results of which are frequently seen in the offspring as consumption, joint disease, and navel ill, which see.

Symptoms.—In the acute form the early signs are general uneasiness and stiffness, the skin is dry and harsh, and the coat stares; the appetite is diminished and capricious, or with rumination probably suspended. The pulse is accelerated and harder than natural, mucous membranes redder than in health; the bowels are constipated, and urine rather scanty and deeper in colour. Suddenly one of the joints—a knee or hock—is found swollen, hot, and painful, which during the ensuing night (without treatment) almost disappears, but the animal suffers from another which has become affected.

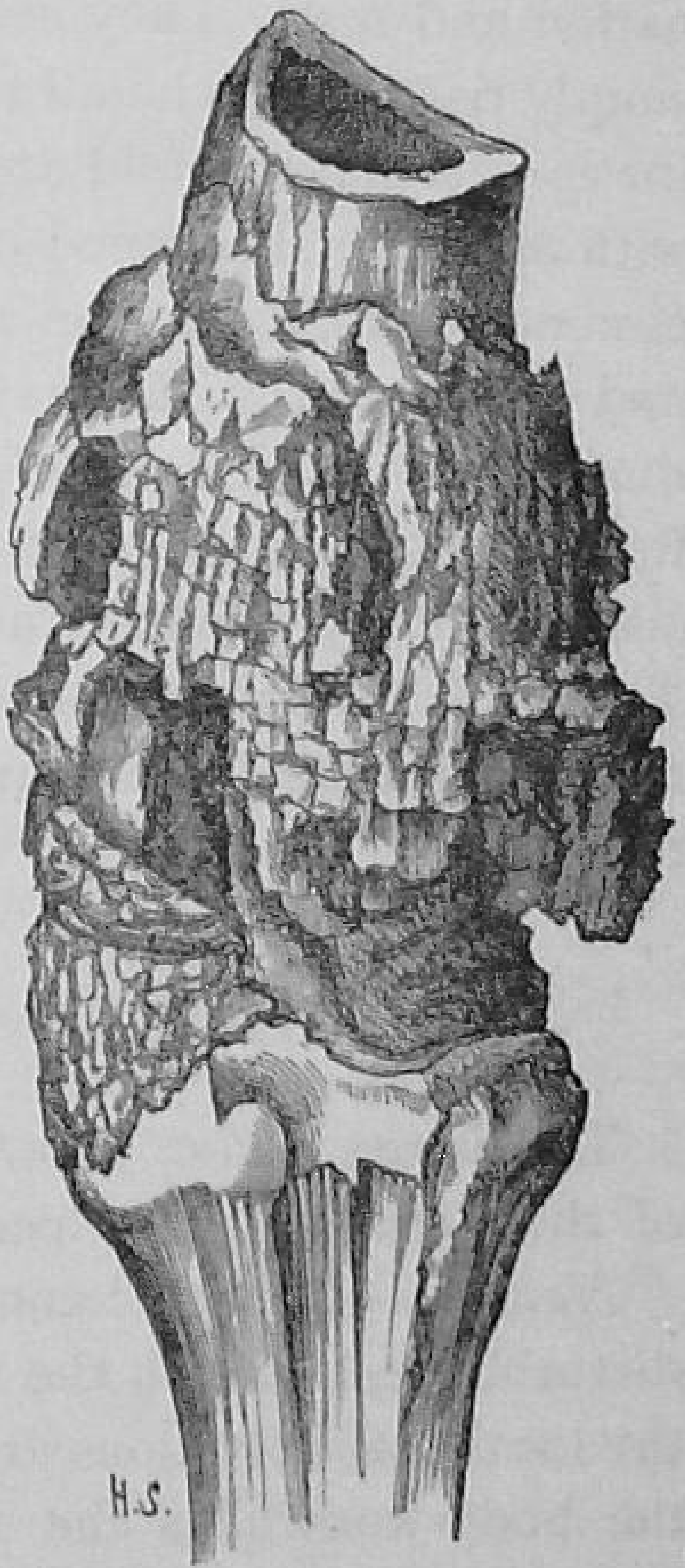


FIG. 16.—*Knee-joint of an Ox after Chronic Rheumatism.*

This disposition to pass from joint to joint is characteristic of rheumatism—a process known as *metastasis;* and it is highly probable that during such occurrences the pleura or lining membrane of the chest, or more generally the endocardium and pericardium—lining and covering of the heart—together with the valves, become affected, and the animal succumbs to rapid disease of the heart.

When rheumatism assumes the chronic form, it becomes

almost stationary in one of the joints, or possibly the whole of one limb may be affected. The disease being confined to a joint, causes it to assume dimensions of an extreme character. It is hot, painful, and stiff, and the animal lies almost continually, losing flesh gradually, and eating little. In this way weeks may elapse without the appearance of benefit, and at length the joint becomes what is known as anchylosed or immovable, and presents the appearance given in the annexed engraving (Fig. 16). The soft tissues are removed, in order to show the state of the bones in which such extensive and serious changes of structure have been going on.

FIG. 17.—*Rheumatism affecting the Hind Leg.*

In other animals the whole of the limb above and below the joint swells greatly; it is powerless, and great pain is endured. Abscesses form among the muscles, and discharge a surprising amount of pus. The animal suffers from continued fever, general prostration, and wasting, and the creature eventually sinks in a state of hectic.

Treatment.—A moderate purgative, such as the following may be given at once.

RECIPE NO. 12.

Take of Epsom salts .... 12 or 16 oz.
Powdered gentian and ginger, of each .... 2 ,,

Mix and combine with a pound of treacle and one pint each of water and linseed mucilage (p. 47).

The affected joints are next to be attended to. The application of a stimulating embrocation is called for, which should be attended with smart friction during ten minutes or a quarter of an hour, and repeated twice a day as long as the swelling continues.

RECIPE No. 13.

Take of soap liniment	8 oz.
Oil of turpentine	4 ,,
Laudanum	2 ,,

If there are evidences of fever continuing after the exhibition of the purgative draught, use salicylic acid in one or two dram doses, or give the following every eight hours until the pulse is softer and fuller:

RECIPE No. 14.

Take of solution of the acetate of ammonia	4 oz.
Tincture of aconite	10 drops.
Water	½ pint.

Mix.

Such a dose requires care, as, after frequent use, poisoning is apt to occur, unless the periods are regulated by the advice and attendance of a veterinary surgeon. In non-professional hands the following may be substituted:

RECIPE No. 15.

Take of sulphate of potash	2 oz.
Sulphuric acid	½ fluid dr.
Water	1 pint.

Mix, and (after solution), administer morning and evening.

When enlargement and stiffness remain after the acute signs are allayed, the joints may be rubbed morning and evening with the following embrocation:

RECIPE No. 16.

Take of soap liniment	4 oz.
Tincture of iodine	3 ,,
,, opium	1 ,,

Mix, and apply with smart friction.

5

During the treatment of rheumatic patients, good beds are required, and all protection from cold, draughts, rain, &c., must be afforded. The food may consist of grass, vetches, clover, roots or mashes of bran, in which boiled corn is mixed. Water, hay-tea, linseed-tea, &c., answer well for drink, and should be given when "the cold air has been taken off." Nutritious food will be required as signs of acute disease abate, and digestion may be promoted by the use of gentian and ginger given in the form of draught.

Animals having suffered from rheumatism are liable to repeated attacks, each of which acquires greater intensity than the first. The proprietor should observe more than ordinary attention towards preventing the disease, by securing absolute comfort and protection from the causes that are known to induce it. Liberal food and regular exercise should be allowed, and the animal made ready for the butcher as quickly as possible.

URÆMIA.

By this term is understood a saturation of the system with materials which pass away by the urine, but owing to disease of one or more organs, are retained and carried by the circulation over the body. It is a state of blood poisoning.

Symptoms.—In addition to the ordinary signs given under "retention of urine," there is observed fever and dulness, loss of appetite, rumination absent, mouth slimy and fœtid, evacuations scanty, hard, and offensive, respirations are slow, pulse also slow and soft, pupils dilated, and a strong urinous odour arises from the skin, the coat stares, and general temperature is low. These signs give way to coma and death.

Treatment should be very early in order to be successful. The bladder must be evacuated at once, and means established which shall reduce the operation of the causes leading to the retention. These will be found detailed under the various affections of the urinary organs in Section V.

APNŒA—DIFFICULTY OF BREATHING.

This condition frequently arises in sheep and lambs, as a result of a suppression of the functions of the skin, which is induced in the former by the use of sheep-salves for the destruction of parasites, and in the latter by the wearing of the hide of another lamb.

When ointments are largely used, the wool is matted together and attracts dust and dirt, which, combined, cause the fleece to assume the nature of an impermeable covering, and thus arrests the due discharge, by the pores of the skin, of pernicious matters from the blood. Carbonic acid, ammonia, and other organic products are collected, and the nutrition of the system cannot be proceeded with; the blood is unable to circulate by reason of the heart being deprived of its stimulus—oxygen—and death ensues by apnœa or partial suffocation. The mortality from this disease is greatly increased at times when ewes and lambs die off from other affections. Thus doubles and triplets are divided, and these, wearing the skin of the deceased lamb, are put under the care of another ewe. The practice is continued too long, and the result is a considerable addition to the deaths.

When mercury, or other poison employed as one of the ingredients of the ointment, is also absorbed into the system, death is probably more rapid, and the signs suffer modification (See Section XIII.—Poisons).

Symptoms of Apnœa.—The premonitory signs are seldom recognized by the shepherd or those in charge. These consist of weakness, dulness, distress, disinclination to move, capricious appetite, disturbed breathing, accelerated pulse, dilated nostrils, eyes staring and bloodshot, and irregular bowels. Usually the symptoms first observed are those of serious import, and the animals die in an hour or two. Suffocation is imminent; the animal pants severely; the pulse is small and frequent, and often indistinct; the eyes become more prominent and deeply injected; the pupils are widely dilated, and blindness is often present, and the sufferer reels; great distress is

evident, after which he falls, violent struggles ensue, and large quantities of frothy mucus are ejected from the nose and mouth before death.

Post mortem Appearances.—General fluidity of the blood, and more or less congestion of the brain and various parts of the body, particularly the lungs. The right side of the heart is overcharged with dark and partially coagulated blood. The whole muscular system is also dark in colour, flabby, and death stiffening has been scarcely apparent. Sometimes spots of ecchymosis are found upon the various membranes.

Treatment.—Wash the ointment from the fleeces or shear the sheep. Remove the false hide from lambs wearing them, and sponge the body with tepid water in cold weather, and in both cases, if possible, apply friction to the skin by means of a brush, &c. If diarrhœa has not set in, give a laxative, and follow it up in one hour by repeated doses of the spirits of nitrous ether in water.

TUBERCULOSIS, TUBERCULAR CONSUMPTION, SCROFULA, PHTHISIS.

In looking into the peculiar conditions of the animal system, we feel justified in placing this affection in the category of blood diseases. Hitherto it has been included with the affections of the respiratory organs, regardless of the fact that other parts of the body suffer equally with them. Most of the veterinary works are silent upon the subject.

Tuberculosis appears to be favoured by hereditary taint. Animals, particularly cows of an attenuated form, thin and spare figure, finely bred, and of dainty habits, frequently breed calves which in adult age become affected with the disease. Nevertheless, tuberculosis appears at times, as far as a history of the sufferers can be taken as evidence, to be totally independent of such influence; but we are not unable even then to account for its origin in certain constitutional peculiarities, and in association with various forms of bad management.

Nature.—In consequence of some unexplained condition of

the system, the nutritious parts of the blood—the pabulum, so-called—is not raised to that degree of elaboration and perfection as is required for the proper nourishment of the tissues of the body. It is incapable of being built up into organized material, and is then termed *aplastic.* In such a condition it is even unfit for circulation, and its accumulation by constant formation would embarras the whole system, and produce a speedy death. Nature therefore provides for its deposition in localities where it will produce the least inconvenience: in those parts the particles become masses, and in process of time the aggregations are so immense as to interfere with life.

In man such accumulations are generally confined to the lungs, but other organs suffer as well, as the mesenteric glands. In the cow large masses are found beneath the lining membrane of the chest (pleura) at the base of the lungs, but unconnected with them, and also throughout the inner surfaces of the ribs, over the diaphragm (midriff), liver, intestines, kidneys, in the mesenteric glands, brain, &c., &c. Here the substance remains for some time without receiving any further development; but at length, it may be months after, signs of degeneration ensue, in which the material undergoes liquefaction, or is transformed into fatty, cheese, or calcareous (lime-like) substance.

The matter of tubercle occurs in circumscribed masses, which vary in size from the head of a pin to that of a filbert. Such occurring on the different organs or inner sides of the ribs, are called by the butchers in Scotland "angle-berries:" they pare them off, and dispose of such flesh as sound and wholesome. In the vicinity of the lungs large quantities of matter frequently accumulate, half vascular, half calcareous or liquefied, and immense sacs form near the kidneys. The writer took out the lungs and heart of a cow some time ago, which, under this affection, weighed seventy-five pounds, besides other large masses that were undergoing degeneration, half cheesy, half calcareous.

Animals that are abundant milkers are prone to the affection; those also affected with nymphomania, or what are commonly known as "bullers," exhibit a great tendency towards it. But these are mere evidences of a condition already present;

both may be regarded as effects rather than the cause, and an inability to elaborate the material necessary to the welfare of the system. The milk in such instances is of a very inferior quality: it is blue and watery, and quite destitute of that amount of nutrition it is generally supposed to possess. It is moreover highly dangerous as human food, as most certainly that by it the terrible disease, phthisis, is communicated to mankind. When the affection is principally located within the mesenteric glands, it is known as *tabes mesenterica*, &c., &c., and more commonly as consumption of the bowels. Animals suffering from this form are called "piners" in Scotland. It is said this disease is exceedingly common in lambs when confined to soils resting on the igneous formations. Removal to districts where the soil partakes of the characters of the sandstone formation at once proves curative.

Symptoms.—Generally the earliest signs are those of anæmia. The heart-beats are loud, but the pulse is feeble and small; the appetite is capricious, and a slight cough exists, with dulness of spirits. All these are of gradual development, throughout which the secretion of milk has suffered no diminution. In a week or two emaciation is perceived to be progressing rapidly, which in well-bred animals appears to enhance their symmetrical appearance for a time, when they merge into a wan, skeleton-like form. The skin now looks dull, and is tightly bound down to the tissues below, the coat stares and feels

FIG. 18.

harsh and dry, and sometimes jaundice or yellowness of the skin and membranes, &c., prevails. The various external glands

of the body are sometimes swollen from deposition of tubercular matter within their substance, the parotid and submaxillary glands being most commonly affected. The cough now becomes oppressive, and when the disease assumes extensive characters, the animal evidently suffers extremely, as depicted by the arched back, and obstinately refusing to move, the head is held low and with the nose protruded, mouth open, with free flow of saliva, and tongue hanging loose, ears drooping, anxious countenance, and uttering a plaintive moan at intervals. The pulse becomes rapid, small, and weak, the beats being upwards of ninety or a hundred. Horns, ears, and extremities are cold, nose dry, mouth hot. The rumen is frequently found filled with food, which is felt in the left flank as a semi-plastic mass, pressure causing depressions that do not disappear, but no pain. The action of the organ is frequently arrested, but the absence of tympany (gas in the first stomach) leaves unexplained the embarrassed breathing. A long groan is uttered in expiration, and the inspiration is irregular, and even spasmodic, not unlike a gasp. Auscultation decides that the lungs are pervious to the passage of air throughout their greater substance, but percussion causes the animal to shrink from the blow, and groan mournfully, particularly when it is directed upon each side of the spine and as far as the disease extends, which sometimes is nearly the whole length. Discharges occasionally occur from the eyes and nose, and diarrhœa of a passive character is established; wasting continues, the symptoms slowly acquire urgency, hectic is established, and terminates a lingering affection, the tokens of which have probably excited much conjecture and even astonishment in non-professional minds.

Post mortem Appearances.—Beneath the membrane lining the chest (pleura), also that lining the abdomen (peritoneum), is found a number of irregularly-shaped masses of various sizes —some as small as mustard-seeds, others as large as a horse-bean or hazel-nut. The lungs in some instances also exhibit the same on their surface, or within their substance, when small abscesses may have formed around them. The liver, mesen-

teric glands, and even intestines are sometimes studded externally as well as internally with them. It is usual when these organs are removed that the abundance of deposit is found. Extending along the spine, between the lobes of the lungs, from the front of the thorax (chest) to the kidneys in the abdomen, are masses of a yellow cheesy-looking substance, enclosed in serous membrane. Sometimes separate conglomerations appear, which are half vascular, half calcareous, or fatty, and which present a mottled or marbled aspect, red, pale yellow, white, or grey, and orange-yellow masses intermingling with each other. The body is almost bloodless, and the fluid which remains is thin and uncoagulable; all the tissues are wasted, and the muscles are pale, flabby, and lack their natural moisture.

The condition of the superficial glands, already noticed as having become enlarged during life, present similar appearances throughout their structure.

The local forms of this affection have been descr[illegible] in former editions of the work under the head of

Cancerous Ulcers.

In certain districts there is a great disposition for the parotid glands to swell, and for a time exhibit a very large, hard, and painful tumour, which, however, does not always interfere much with the animal's masticatory powers. (Fig. 19.) Shortly,

Fig. 19.

Fig. 20.

this becomes a soft, diffused, fluctuating sac, which has only the skin for its covering, and, on being opened, discharges a large

quantity of fœtid, degenerated pus. This disease is known as "cliers" in Scotland. The healing powers are tardy, and the swelling is apt to recur from time to time.

The bones also are implicated under a scrofulous diathesis, and present another local form, which proves troublesome in a variety of ways. The jaws, both upper and lower, are apt to suffer; and upon them form large tumours, which interfere very much with mastication and condition. (Fig. 20.) The engraving represents a bull suffering from an enlargement of the kind referred to, implicating the superior maxillary bone. Fig. 21 represents one of the same kind upon the lower jaw. In the vernacular and among quacks and farriers, these

FIG. 21.

FIG. 22.

tumours are denominated "cancers," and sometimes "canker." Their practice consists in deluding farmers and others that they can remove such by a simple dressing, and the animal "will thrive as well as ever afterwards." The dressing usually consists of some severe caustic mixture, which causes the parts to slough; but, as agents of this kind have no respect to tissue, acting on sound as well as unsound, the results are generally unfavourable. Fig. 22 represents the bull after the wrongly-named cancer had been removed by a "quack:" the whole of the cheek had sloughed, as well as some of the bones of the face, and the food as taken into the mouth passed out of the opening. Absorption of the poisonous ingredients also took place, the animal was overtaken by paralysis, and he was

humanely shot by the owner, who had become disgusted at the sight.

Such tumours appear in cows, bulls, and steers between the ages of two and six years. Steers and cows are most commonly affected. At first the disease appears as a small round painful nodule, which gradually enlarges beneath the skin, but preserving a perfect separation, the latter moving over it with ease and freedom. When, however, any irritating applications are applied, or the parts are struck, inflammation is set up, followed by ulceration. The mass exposes a raw discharging surface, great pain is felt in mastication, the bones are further

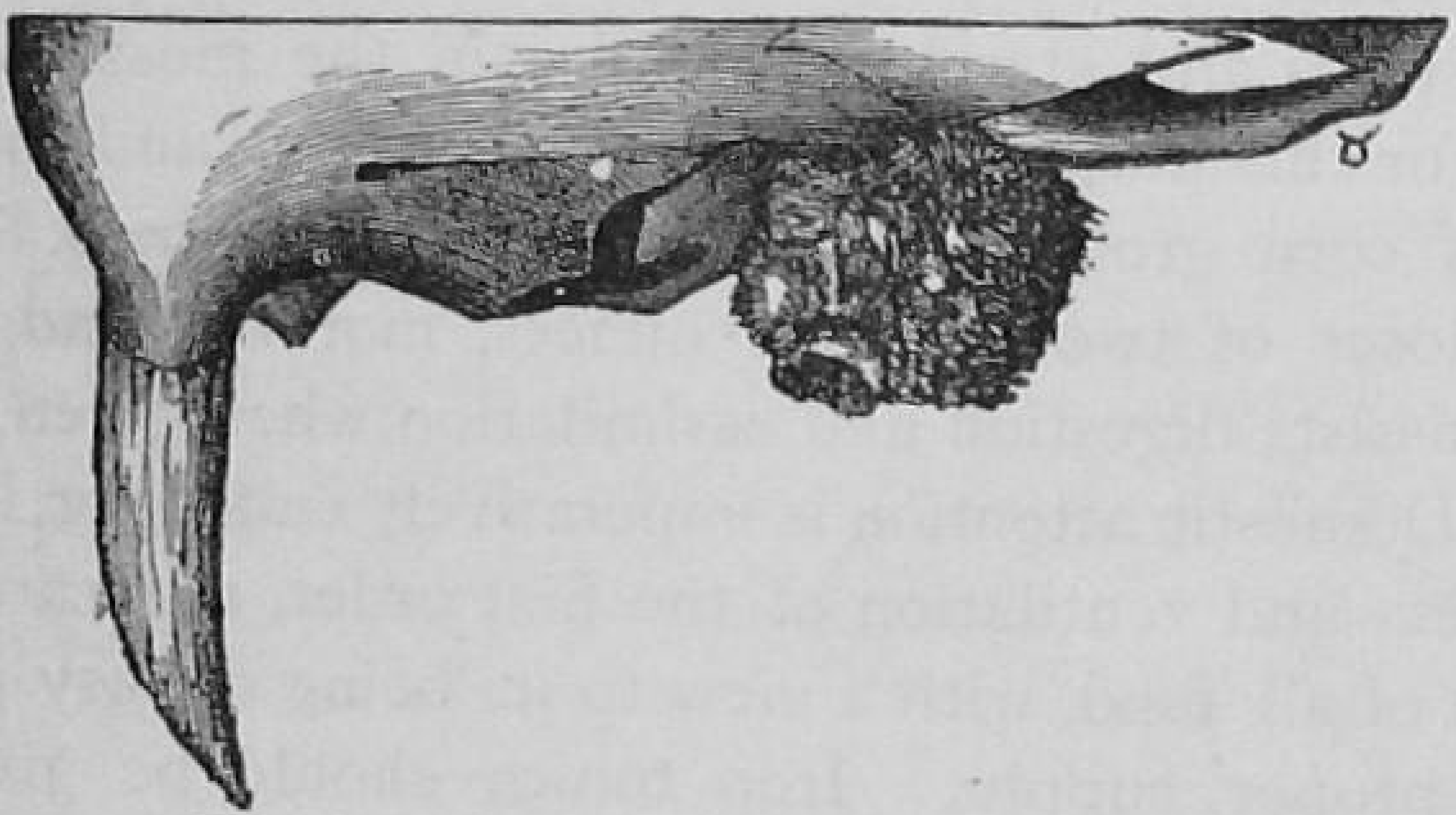


FIG. 23.—*Tumour of the Upper Jaw.*

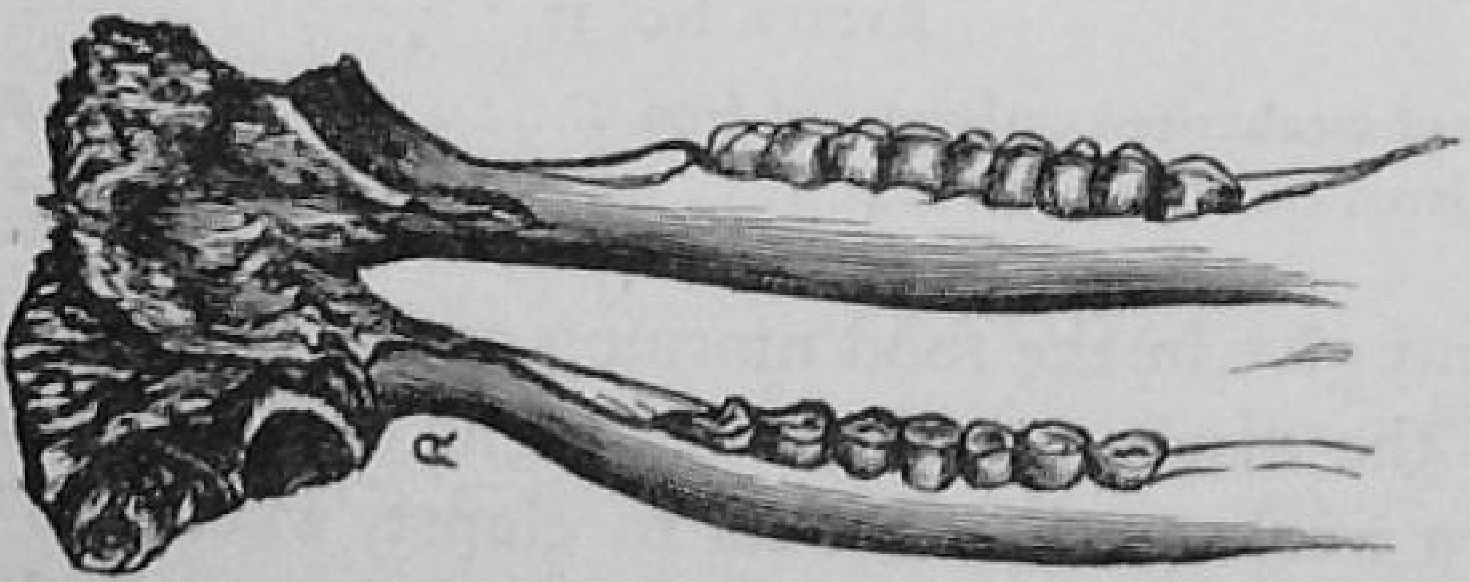


FIG. 24.—*Tumour of the Lower Jaw displacing front teeth.*

invaded, teeth become loose and eventually drop out, and not uncommonly a communication is established with the mouth. Such tumours occupy months in their formation, being the result of an imperfect development already referred to. Figs. 23 and 24. The soft tissues immediately in connection are

converted into a thick dense fibrous mass; the bone is changed into a porous body, having large cavities enclosing granular accumulations, and formed of sharp thin bony plates. Such diseases have received the various names of *spina ventosa, ostea sarcoma*, and *fibro-plastic degeneration of bone.*

Treatment.—Animals affected with tuberculosis are decidedly incurable in the present stage of veterinary science, and in that particular we are not behind our brethren in the medical profession, who as yet can do more with consumption in the human subject. The line of treatment is purely one of a dietary nature. Young animals suffering from the abdominal form, known as "pining," should be removed from soils on the igneous rocks to sandy or loamy soils. The dry food should contain fatty and starchy principles in the most assimilable form. For this purpose linseed cake is useful, and the various kinds of corn ground into flour, particularly peas. Linseed oil, in doses of two or three ounces, morning and evening, greatly assists digestion and assimilation when given with the above. Domestic attention is imperatively called for, including cleanliness and ventilation of the first order, and careful preparation of all food, with a view to its being of easy digestion and in proper supply. Iron tonics should be given with caution, a form of which is subjoined.

RECIPE NO. 17.

Take of saccharized carbonate of iron	2 drs.
Powdered columbo	2 ,,

Mix, and give in the food morning and evening, in the early stages of the disease, during a fortnight or a few days longer, allowing a week or thereabouts to elapse, when the medicine may be continued; and so on alternately, until the animal obtains flesh, and can be removed to the butcher. When the affection has reached the extreme stages, and wasting has commenced, with glandular enlargement, the flesh is no longer suitable for human food.

In the form known as cliers, the animal should receive similar treatment. The abscess in the parotid gland should be

opened, and healing action induced by strong injections of some caustic mixture, as the following:

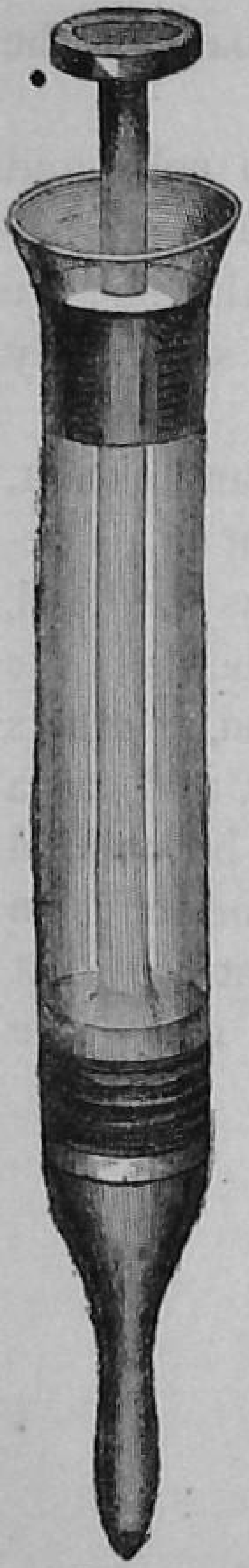


Fig. 25.

RECIPE No. 18.

Take of butyr of antimony	1 oz.
Tincture of myrrh	2 ,,

Inject, by means of the glass syringe as shown in Fig. 25, once daily. The various preparations of biniodide of mercury, red precipitate, mineral acids, &c., are sometimes used, but the above will be found sufficient for most purposes.

When tumours form upon the bones, as described, the proprietor should at once seek a definite opinion, and have the necessary constitutional treatment adopted in order to promote the laying on of flesh. If mastication is impeded, or the disease assumes a general form, all hope of profit in the animal may be lost. No outward applications will effectually remove scrofulous tumours, therefore they are best left alone, as far as actual cure is concerned, acting on advice sought with a view towards making up the animal for the butcher.

PURPURA HÆMORRHAGICA.

This affection is frequently observed in the horse, and occasionally among swine, but is less common to bovine and ovine animals. Calves have suffered more from it in the writer's experience than adults, but it is likely to occur in them under certain conditions.

Nature.—A specific or septic blood disease,* in which local

* There are grave reasons held by some writers for placing this affection in the category of Anthrax maladies. The peculiar characteristics as exhibited in the horse are rare in cattle; the conditions favourable for this disease doubtless, as a rule, merges quickly into carbuncular states, which of course prove fatal.

manifestations are confined in major part to the skin, and next to analogous tissues, as mucous membranes, cellular tissue, certain portions of organs, as the parenchyma of the lungs and kidneys, and the parts between the coats of the intestines.

Causes.—Poverty and bad living, exposure to cold, and other debilitating influences; previous severe diseases are fertile causes. It sometimes occurs in young animals that are growing rapidly, when the food supplied is not sufficiently nutritive.

Symptoms.—Diffused swellings of variable form and extent, by which the skin is elevated. Preference is given to all dependent parts, and those covered with loose skin, as the head, face, dewlap, beneath the chest and abdomen, and between the legs. These are sometimes rapid in their formation, at others slow. If the membranes of the eyes, nose, mouth, and vulva (shape) in cows are examined, they will be found to be studded with purple spots (*petechiæ*). Motion is difficult from effusion between and around muscles. The pulse is full at first, but rapidly becomes small, hard, and wiry, a stage at which the malady is most commonly detected.

FIG. 26.

As the disease advances, the swellings are covered with a reddish-yellow-looking fluid that oozes through the skin; sometimes blood itself issues in rapid drops from numerous points over the whole surface of the body. The eyes, nose, face, throat, and neck are involved, as represented in Fig. 26, in a diffuse swelling, obstructing vision, deglutition, swallowing, and

even breathing. The pulse becomes weaker, and if the animal has partaken of food and drink up to the present, he does so no longer. Milk has suddenly ceased in dairy stock, and the small quantity that is drawn is mixed with blood. The bowels, at first costive, are now loose ; prostration of strength is great, abdominal pains ensue, breathing is difficult, urine albuminous and mixed with blood. Sometimes large ulcers form in the locality of swellings, but usually the animal dies before such a stage is reached.

Post mortem Appearances.—All parts of the body where space admits, as beneath the skin, between muscles, and the coats of the intestines, &c., &c., are filled with dark or purple-black fluid blood, and an admixture of lymph. The structures are thus caused to assume a purple or Modena red colour. In all parts characterized by little or no motion the deposits are profuse. The membranes covering the abdominal viscera (peritoneum) and that of the chest (pleura) are studded with patches called ecchymosis, or extravasated blood. The heart, bladder, brain, and nervous system are also similarly affected.

Duration, Prognosis, &c.—Fatal cases occur in from two to six or seven days. Among cattle the Author has known it to be rarely otherwise than a highly destructive disease ; doubtless aggravated much by delay in calling for assistance. Favourable cases are betokened by return of strength, decline of fever, resumption of appetite and secretions, with cessation of superficial effusion, and disappearance of swelling. The pulse also becomes fuller and stronger, strength returns, movement is easier, and the animal lies down ; the appetite improves, pain subsides, &c.

Treatment.—It is highly useful to move the bowels gently during constipation, by the use of such a draught as the following :

RECIPE NO. 19.

Take of pure linseed oil	1 pt.
Sulphuric ether	1 oz.
Infusion of quassia	4 ,,

Mix, and administer to a cow: one-half will be sufficient for

a year-old stirk, and one-third for lesser animals. In some cases that appear to depend on an unnatural plethora, a moderate blood-letting is serviceable, if conducted during the time the pulse remains full and tolerably strong. Turpentine is a very valuable remedy as a constringent agent or styptic to the relaxed blood-vessels; but its use must be watched very narrowly, as the urinary organs are liable to be irritated by it. Full doses are one or two ounces two or three times a day, given with white of eggs, gruel, &c. The next agents are the mineral acids, as the sulphuric, nitric, or hydrochloric, which may be given as follows:

RECIPE No. 20.

Take of sulphuric acid or oil of vitriol (pure)...........	2 or 3 drs.
Infusion of quassia, columbo, or gentian	½ pt.
Water	1 qt.

Mix.

RECIPE No. 21.

Take the tincture of perchloride of iron	2 drs.
Spirits of nitric ether	2 fld. oz.
Infusion of quassia	½ a pint.

Mix.

RECIPE No. 22.

Take of nitric, or hydrochloric acid (pure),...............	2 or 3 drs.
With the infusions, &c., as above.	

Mix. Either of these draughts are sufficient for a moderate-sized cow, and should be repeated two or three times a day. Half-doses for year-old stirks, and one-third or one-fourth for lesser animals. Mineral tonics (as the sulphate of iron, in doses of one or two drams) will also be found of service after two or three days have elapsed. The best menstruum is an infusion of quassia. Diffusible stimulants are required when great debility occurs; such as the following forms are especially called for:

RECIPE No. 23.

Take of spirits of nitric ether	2 or 3 oz.
Infusion of quassia, gentian, or columbo	½ pint.

Mix, and administer three or four times during the day.

Good food, cleanliness, clothing, proper ventilation, housing, and all domestic comfort must be secured. Green food, or carrots, turnips, &c., &c., are specially called for when the appetite returns.

Local Treatment.—The eyes and nostrils should be frequently and carefully sponged, to free them from accumulating irritant discharges, and afterwards carefully annointed with the "Antiseptic Mixture" described under "Heaving Pains;" beyond this for a time nothing further need be done. Sometimes from rapid increase of swelling about the nostrils it is necessary to open the windpipe (see Tracheotomy). When constipation is severe, frequent clysters are called for; and if, on account of great debility, the contents of the bladder are not expelled, their removal will be needed, for which the catheter is employed. (See Retention of Urine).

B.—BLOOD DISEASES ARISING FROM AN INORDINATE, IMPAIRED, OR ARRESTED FUNCTION, WHICH PREVAIL AS ENZOÖTICS, viz.:

MALIGNANT CATARRH.
ARTHRITIS, OR JOINT-ILL IN LAMBS AND CALVES.
ASTHENIC HÆMATURIA IN CATTLE.
SIMPLE OR IDIOPATHIC ALBUMINURIA.
MALIGNANT SORE THROAT.

MALIGNANT CATARRH OR CORYZA, *known also as* CORYZA GANGRENOZA.

This affection has been confounded with purpura hæmorrhagica and cattle plague or rinderpest, in some points of which great resemblance exists.

Our experience of this disease leads to the conclusion that it prevails at times when contagious diseases are declining, especially when hot and dry days are followed by cold and wet. We also believe that tainted pastures and buildings have something to do with its origin.

Nature.—A specific or malignant condition of the blood in which catarrhal signs are prominent, affecting chiefly the sinuses of the head in young cattle and oxen generally. Old cows are seldom affected. It has been denominated "glanders of the ox tribe."

Although the prevalence of this malady has not been specially noticed in the sheep, it seems that among the many vague accounts of peculiar outbreaks which reach us from time to time there is more than a suspicion that it is not confined to cattle alone.

Symptoms.—Three stages of the affection may be described. In the *first*, a shivering-fit may be observed, and the animal is separated from the rest in the pasture. Shortly he is dull, the head is held low, ears pendulous, visible membranes assume a bluish-red colour and are dry. The eyes are closed and swollen. Tears flow, and light cannot be endured. The muzzle is dry and hot, and saliva is sometimes discharged abundantly. There is a painful cough, the pulse is frequent and full, but the heart's action is feeble. The cough becomes even more painful as the disease advances, and the breathing is accelerated and sometimes catching. The bowels are costive, fæces black and hard, but shortly diarrhœa ensues. The animal is thirsty, but eats nothing, and the urine is scanty, offensive, and has a high colour.

FIG. 27.—*Malignant Catarrh, first stages.*

The *second stage* occurs within eighteen or twenty-four hours from the appearance of the first signs of disturbance, and is denoted by a marked change in the character of the discharges. The membranes of the eyes and nose now furnish a purulent secretion, having an admixture of blood and ichor, which irritates and makes sore the skin over which it flows. Within the sinuses of the head large accumulations of pus occur, and when the bones over them are tapped by the fingers (percussed) a dull sound is emitted. If the mouth is opened, dark red patches will be observed on the tongue and inner sides of the cheeks, caused by the effusion of blood and lymph, &c.,

beneath the mucous membrane, which in some places will have fallen off, exposing a foul ulcer beneath, and the membranes have now assumed a deeper purple hue, and the breath is very fœtid. The animal is lame, and if lying will not rise; he also experiences great pain when urine or dung is discharged. Pregnant animals are almost sure to cast their young. From the first an increase of temperature may be noticed, but now the thermometer registers 104° or 105° F.

Third Stage.—Great prostration is evident. Sloughing of membranes is extensive, giving rise to large and extending sores with offensive discharges, and probably the horns and hoofs have come off. The pulse has become imperceptible; convulsions ensue, with general coldness. The thermometer indicates a rapid and unusual fall, 90° to 95° F. being the amount of heat that can be registered at the rectum. Some-

FIG. 28.—*Malignant Catarrh, second or Sloughing stage.*
Horn removed, and ulcerations have appeared on Nose and Lips, &c.

times ulceration and perforation of the cornea is effected before death, and the contents of the eyeball are discharged, giving rise to a great amount of additional pain.

Post mortem Appearances.—These will be generally apparent,

having alluded to them incidentally in an enumeration of the signs. The whole series of membranes—mucous and serous—are studded with ecchymosis, and sometimes the brain and spinal cord afford signs of inflammatory action and softening, while the cavities contain an increased quantity of fluid. The whole organs of the body are softened and congested, and the blood-vessels are filled with dark or black fluid blood. The sinuses of the head are filled with offensive pus, and the bones are softened; the lining membranes are covered in places with blue or purple spots, while at others the epithelium is removed, and angry-looking ulcers occupy its place, having discharged blood before death. The surface of mucous membranes have a livid or Modena red colour. Removal of epithelium, with the changes just stated, are also common to the back of the mouth, fauces, gullet, windpipe, stomach, and intestines generally.

Diagnosis.— Malignant catarrh may be confounded with cattle plague (rinderpest), and purpura hæmorrhagica. It is, however, distinguished by the following tests. From rinderpest it is known by the fact that young animals and oxen are chiefly affected; that it occurs after exposure to cold rains, &c.; that only one, or perhaps at most two, out of a herd are seized, and with their death the affection ceases, thereby deciding its non-contagious nature. From purpura hæmorrhagica it is known by the absence of diffused swellings and sanguineous (bloody) or sero-sanguineous (blood and serum) exudations from the skin.

Duration.—From three or four to nine or eleven days. The writer's experience of the affection has been confined to some of the most rapid cases.

Treatment.—Remove the animal from the pasture, and place it in a comfortable cool place with good bedding. Cooling or evaporating lotions (Nos. 2, 3, 4, 5, 6, pp. 30 and 31), water, &c., should be constantly applied to the head. Bleeding moderately while the pulse is full may be attended with benefit. Injections should be thrown into the rectum, and a laxative dose administered, such as the oil mixture recommended for purpura hæmorrhagica (page 78), or the following drench:

RECIPE NO. 24.

Take of Epsom salts	8 oz.
Ground ginger	2 oz.
Treacle	½ lb.
Linseed mucilage	1½ pts.

Mix, and give to a two-year-old beast; two-thirds for one a year old; half at six months; and a quarter for lesser animals, as calves, sheep, and large pigs. A long seton placed in the dewlap in the earliest stages also proves beneficial. Two to four drams of nitre may be given in water three or four times a day, or acetate of ammonia, in doses of one to four ounces at similar intervals, in water, during the existence of great fever.

When the animal is found at the termination of the second stages, stimulants may be required, mineral acids or the tincture of iron—such draughts as are recommended in Recipes Nos. 20, 21, 22, page 79. Solutions of carbolic acid, or sulphurous acid and chlorine gases in water, or the antiseptic mixture described under "Heaving Pains," should be used for the purpose of dressing the wounds and cleansing the points of discharge, &c. It may also be necessary to open the sinuses and syringe them, using the same solutions. Sometimes setons passed through them are beneficial. Frequent stimulants are needed from the commencement of the second stages.

ARTHRITIS OR JOINT-ILL IN LAMBS AND CALVES.

Under the above title we have to describe an affection in lambs and calves which has attracted notice during late years, particularly as it has been observed to prevail more commonly than heretofore. A personal friend of the Author—Professor Robertson—has paid great attention to this disease, and his views, which are embodied in the following observations, are particularly worthy of note.

Two forms are recognized, though it not unfrequently happens they are combined in the same animal. The first appears purely of a rheumatic character, and is often observed in calves; the second is dependent upon a scrofulous character and here-

ditary taint. A combination of these we may with some degree of accuracy view as a third variety. It may also appear in conjunction with "navel-ill," so-called.

Symptoms.—The signs are generally of a very sudden character, and appear when the animal has arrived at the age of several weeks. One of the joints is severely affected: it is swollen, the capsule is distended, hard, and exquisitely painful. Fever runs high, surface heat is increased, and the thermometer shows an augmentation internally; the visible mucous membranes are deeply injected, respiration is accelerated, and lameness very acute. The pulse is rapid and hard, bowels costive, urine deficient and highly coloured, appetite and rumination

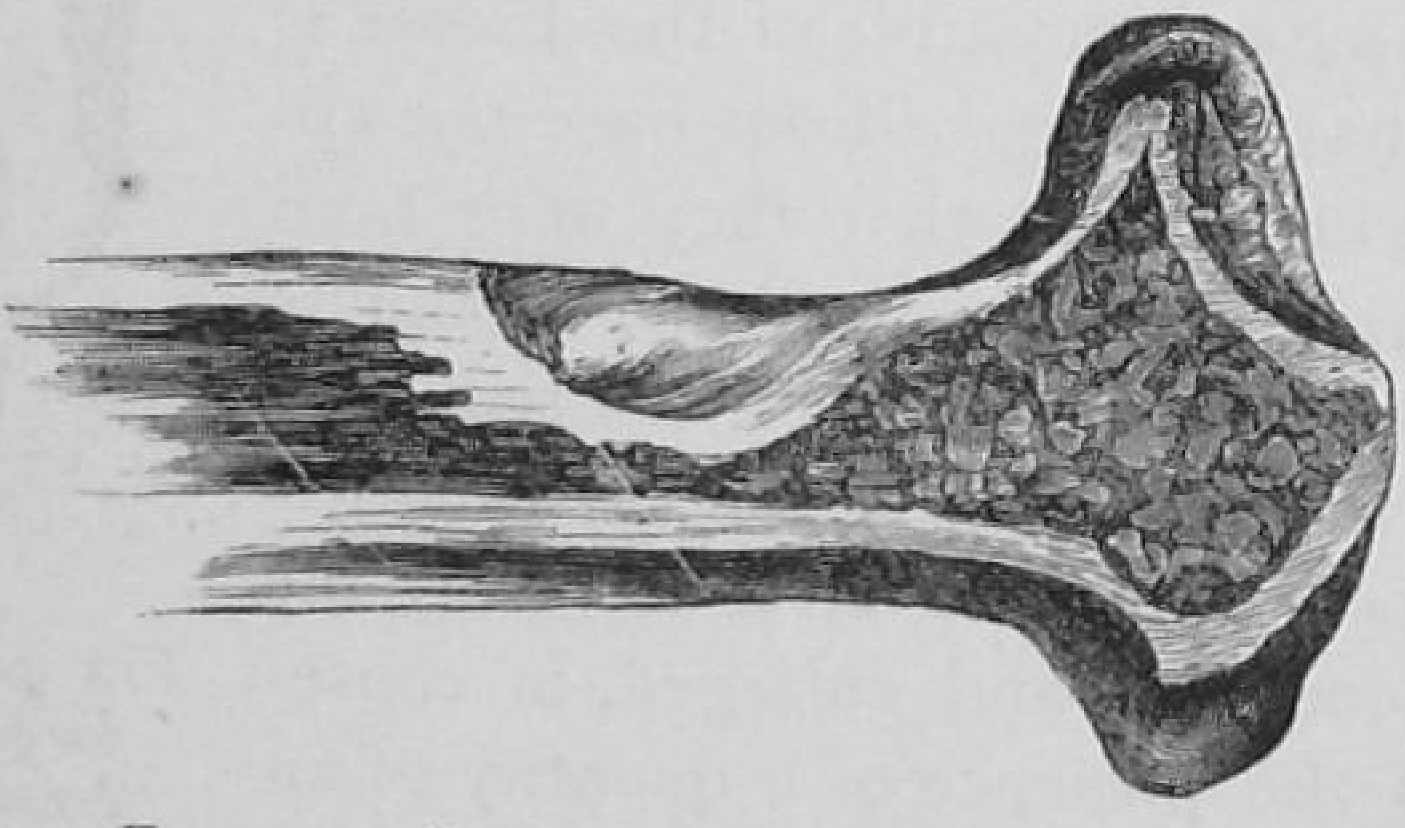


FIG. 29.—*Section of Thigh-bone (healthy).*

suspended or absent. A great peculiarity of the rheumatic form consists in the sudden disappearance of local signs from the affected joint, and their equally abrupt appearance in one or two others previously sound, or there is probably total subsidence of the whole of the signs—the parts being restored by the usual process of resolution. This latter is, however, not general or common; on the contrary, the disease frequently continues, and the joints are permanently diseased. Effusion of lymph occurs within the articulation, the bones inflame, and the functions of the joint are no longer discharged; it then becomes stiff and immovable from the deposit of ossific matter, which brings the whole of the surfaces into a state of union (anchylosis), as shown in Fig. 16. In the *scrofulous form* the mobility of the joint

is not always particularly affected. The disease is located within the porous substance which fills up the ends of bones, called cancellated or spongy tissue. Here we have characteristic distinctions which sufficiently separate this form of disease from the rheumatic variety. Instead of the greatly distended and painful capsule of the joint or articulation, we have decided swelling of the bones above and below. Tubercular matter is deposited within the substance of the osseous tissue, which leads to degeneration, porosity, and enlargement, and the formation of pus, which, by the ultimate invasion of substance, not unfrequently finds its way into the capsule of the joint. In addition we have the usual evidences of fever, but the most distinctive sign cognoscible of the disease is the fact that these conditions have not appeared suddenly, but that they were born with the animal. The system also exhibits the peculiar scrofulous cachexy, or tendency towards tuberculous deposit. Enlargements appear about the navel at birth; the belly is pendulous and enlarged, in consequence of the presence of a quantity of an opaque or turbid fluid within the abdomen. The umbilical cord does not undergo the usual change of contraction, but becomes the seat of numerous cysts containing tuberculous matter. The liver also and the omentum contain similar deposits. Wasting and general emaciation follow, and a small percentage only recover, these betraying the greatest possible difficulty in any approach towards being remunerative, in the face of the trouble and delay they have occasioned.

FIG. 30.—*Bone enlarged from Tubercular Deposit, and hollowed by formation of subsequent abscess.*

Such a description will convey to the curious reader the fact that the disease is due to hereditary influences; therefore, in order to restrict the operations of the evil tendencies, great care should be exercised in the selection of breeding stock, and its treatment during pregnancy. Medical means are of little avail in the chronic forms of arthritis; and in the acute

stages, success entirely depends upon their being promptly instituted.

In order to guard against the occurrence of tuberculous conditions, breeding must be conducted from sound healthy stock. Animals possessing a weedy character, long thin neck, inferior or narrow chest and loins, pale membranes and weakly-looking eyes, pot-bellied and attenuated appearance, or any approach to such conditions, are those which generally possess the seeds of tuberculosis in their bodies, and should be isolated from those intended for breeding purposes.

But the condition is induced in others apparently healthy, as well as their offspring, by irregular, inferior, and deficient food, climate, soil, housing, and other evil influences long continued that obstruct the general process of assimilation. The laws of health require great attention, and when they are more generally understood, we shall hear less of these tedious and harassing cases of arthritic diseases in lambs and calves.

Medical Treatment.—Perfect stillness must be secured for the affected joints, particularly in young and weakly animals, which may be obtained in some instances by the use of starch bandages; in others the use of strong tincture or ointments of iodine, and even blistering ointment, is attended with marked benefit. Internally the following medicines may be variously used:

RECIPE No. 25.

Take of solution of acetate of ammonia	2 oz.
Tincture of aconite	10 drops.
Water	½ pt.

Mix, and give to a calf night and morning, and one-fourth to lambs.

Another good remedy is the acetate of potash, which may be given in the following form:

RECIPE No. 26.

Take of acetate of potash	1 dram.
Aconite	5 drops.
Water	½ pt.

Mix: to be given to a calf two or three times a day, or one-fourth to a lamb during the same intervals.

Returning appetite, disappearance of pain, &c., must receive careful consideration. Too much food must not be allowed, but small quantities of a highly nutritious character, with which tonics must be given.

RECIPE No. 27.

Take of syrup of the iodide of iron	3 fluid drs.
Water	10 ,, oz.

Mix: a dose for a calf morning and evening, and one-half for lambs. This should be always given when the stomach contains only a small quantity of food, if possible.

ASTHENIC HÆMATURIA, *commonly known as* RED WATER, BLACK WATER, &c.

This is a form of hæmaturia included under the variety known as *idiopathic*, or arising from causes not always sufficiently apparent, being generally of a multiplied character. The term hæmaturia signifies a discharge of blood in urine, and as an attempt to describe with more fitting exactness the nature of the affection, that of *hæmo-albuminuria* has been suggested.

The affection is characterized by enzoötic tendencies. The peculiarities of season limiting the quantity of good and natural aliment, drives cattle and sheep to partake of plants, the nature of which particularly unfits them either as articles of food or nutrition; they are rather to be viewed as of foreign and even irritant properties. The locality and position of land favouring undue moisture, or by being inefficiently drained and manured, producing crops of an inferior kind, is a prolific cause. It has been said to be a disease common to the poor man's cow, and it may be also said with equal truthfulness, that red water is a disease of bad farm management generally.

Eminently a disease in which the vital properties of the blood are interfered with, the constitution of that fluid is severely reduced. We have shown that the blood is maintained

by a process peculiarly its own, as a result of the digestion and assimilation of food. In the preparation of those materials necessary for the blood, the digestive organs, comprising the liver, pancreas, spleen, stomach, and intestines, &c., must be in perfect order; but when their action is arrested or perverted by the presence of foreign bodies in large quantities, as badly-grown turnips, indigestible and unsuitable plants, &c., the blood formation is seriously damaged. The red corpuscles lack their proper degree of stability, and other component parts are without their necessary elaboration and constitution. There can, therefore, be no difficulty in understanding that, with the blood as an improperly constituted or non-elaborated fluid, the secretions of the body will be greatly deficient, and general nutrition reduced; the functions of the kidneys, which are called upon to separate the excess of the unnatural constituents will also be greatly increased, and, by the weakness that naturally follows, their functions also greatly perverted.

The practice of feeding sheep, especially breeding ewes, stall-fed cattle as well as others, upon large quantities of turnips in cold weather, has not been sufficiently considered by owners of cattle, particularly those kinds that are the produce of ill-drained and ill-manured lands. Besides their want of proper sustenance, their physical effects as containing an immense proportion of water (70 to 90 per cent.), and particularly by communicating a great degree of unnatural cold to the system, have a potent influence upon the resources of animal heat. That process is retarded, and blood-formation cannot go on efficiently. We must remember that the rumen alone of a cow can accommodate a large quantity—two and even three bushels—of food. Suppose the greater portion of the contents of that compartment is made up of turnips, 100 parts of which contain 75 parts of water. The mass must receive warmth before it can become assimilated, and it robs the stomach, liver, and *all* parts of the body of the necessary heat before it can pass. Turnips are not unfrequently ice-cold—32° F.—when given, and the mass within the stomach is a long time before it can reach the temperature called blood heat, viz.,

100° F. It is not, therefore, uncommon to find the contents of the rumen at a very low temperature in animals dying shortly after the stomach has been charged with such an unnatural mass. The nutritious principles of the food also are much diluted, and liable to pass too quickly out of the body by the intestines, and thus are lost to the system. Turnips at the best contain but a very small quantity of the albuminous or flesh-forming constituents, and when they become too exclusively the food of cattle and sheep, the repair of the system is not properly provided for. The whole, therefore, reduces the nervous system, destroys the tone of the digestive organs, and disease is the result. One of the most common out of many kinds taking place from the same cause is red water, so called.

Nature.—This affection is essentially a blood disease, the result of imperfect digestion and assimilation, characterized by serious disorder of the liver, degeneracy of the plastic materials and corpuscles of the blood, and their final discharge through the kidneys in an altered condition. Asthenic hæmaturia affects both cattle and sheep, and is attended with a great amount of debility; hence the term asthenic, which has been applied to it. Cows are most commonly affected, a fact which may be attributed to the demands made upon the system by the secretion of milk and process of gestation. It is sometimes associated with parturition in these animals, appearing within a period extending from eight to fourteen days. Among sheep, ewes are the principal victims.

Symptoms.—Throughout the progress of the malady anæmia is present. This will be at once apparent after what has been said regarding the arrest placed upon the assimilative functions and organs of digestion, culminating in a false or deficient formation of blood material. The cow also exhibits a tendency to rapid emaciation from the same cause, weakness is great, and increases as the disease advances; the heart-beats are heard at some distance, as a result of the thin watery state of the blood in advanced cases, and the venous pulse is well developed in the jugular veins. Allied to, and depending upon

these states, may also be observed extreme coldness of the extremities and body generally, a feeble and frequent pulse, paleness of the mucous membranes, and such indications that betoken a bloodless state of the whole system. These signs, however, are progressive, and appear somewhat in the following order:

In the *first stage* the animal exhibits signs of general derangement, as suspended appetite, rumination, and probably also the secretion of milk, particularly if diarrhœa is present at the outset. When the bowels are acting properly, the disease is more easily overcome; but usually diarrhœa of an obstinate form is present, or rapidly succeeds the confined state of the bowels, the skin becomes harsh and dry, the coat stares, and a yellow tinge, with a quantity of scurf and dirt, is seen between the erect hairs. A degree of dulness is visible, and the animal no longer associates with the rest when in the pasture; the eyes present an unusually sunken and haggard appearance; the back is arched upwards, abdomen pendulous, and sometimes distended, or flanks hollow; flesh wastes, the pulse becomes frequent and feeble, general coldness prevails, mucous membranes are blanched, and sometimes slight colicky pains arise, causing a little uneasiness, or the creature prefers to lie persistently. If diarrhœa is present, the urine may not possess a deep colour; but under constipation, and decrease of other secretions, it is red, reddish-brown, or dark claret colour, and a slight degree of pain is evident on urination.

The *second stage* may be entered before the expiration of forty-eight hours. When the respiration is disturbed, the pulse becomes smaller, more frequent, and feeble in character; the anæmic murmurs of the heart are loud and strong, and the venous pulse is fully developed; constipation is decided, and urination more frequent, but the discharge is less, accompanied with greater pain, and has acquired a fœtid odour as well as deeper colour; it is now nearly black, and of greater density. Such signs proceed with greater or less rapidity and intensity for one or two days, when speedily the *third stage* is developed. Abdominal pains are frequent, and the animal moans in a me-

lancholy manner; coldness, exhaustion, and emaciation have rapidly progressed; the pulse has become indistinct, the anæmic murmurs of the heart are but feebly heard, or are absent; mouth cold; the animal has no power to rise, gives no evidence of

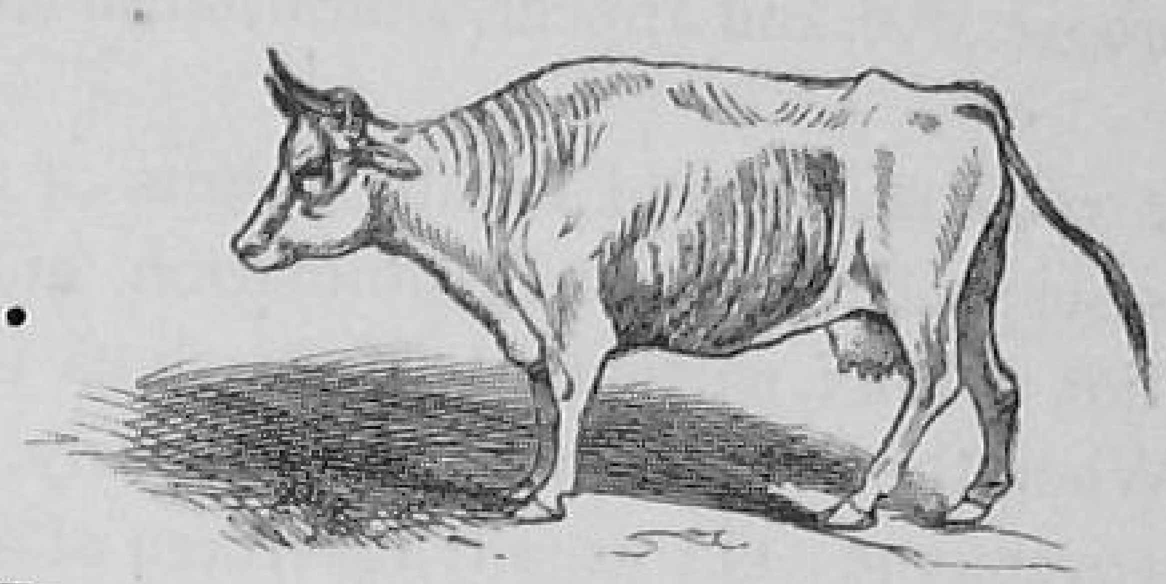


FIG. 31.—*Asthenic Hæmaturia—Red Water.*

attention to surrounding objects, and in this manner sinks about the third or fourth day.

In some instances an intense thirst marks the second stage at commencement, when the difficulty that has existed against the action of purgative medicine gives way, the contents of the stomach absorbs the fluid as it is drank, and relaxation follows. The symptoms of constitutional disturbance gradually subside, the urine gives less pain on emission, is more copious, somewhat lighter in colour, thinner, and less offensive, and general improvement may follow. At other times these signs are but the precursors of a more protracted stage, and the creature dies at variable periods.

Post mortem Appearances.—The carcases of animals dying from this disease are pale and greatly emaciated, and the blood-vessels, including even the heart itself, are nearly destitute of blood. The appearances as concerning the latter condition greatly resemble that observed after animals have been bled to death. The signs of blood poisoning are also frequently present in the forms of patches of ecchymosis upon the serous membranes, more especially inside the cavities of the heart. The liver is congested and softened, the gall bladder full, kidneys pale, but structural disease is not apparent, except in prepared microscopic specimens, which display an enlarged condition of the parts called the malphigian tufts

and conduits leading from them; a fact that points out more plainly that the blood has undergone its state of degeneracy within the circulatory system, and not in the structure of the kidneys, as was formerly supposed.

From the readily soluble property of the colouring matter of the blood in water, the fluid effused from the blood-vessels at various parts carries with it the characteristic tinge, communicates it to all the neighbouring tissues, and produces stains sometimes viewed as inflammation. The organs contiguous to the kidneys are frequently tinged also with the colouring matter of the bile, assuming a yellowish-red appearance. A turgid condition of the mucous membrane, of the small intestines, and sometimes of the fourth stomach also, is frequently observed, and likewise falsely regarded as inflammation. The rumen contains a fair quantity of food, and the third compartment—manyplies or omasum—is acutely constipated, hard, and filled to repletion; the epithelial coat is readily detached, when portions of the food are moved. The second and fourth stomachs are empty, or the former contains only fluid, and the lining membrane of the latter, with that of the small intestines, is coated with a layer of mucus, having a chocolate colour, from an admixture with blood material.

The *urine* of this disease exhibits characteristic peculiarities. The density is considerably increased, reaching to 1,050 or more; the colour a dirty red, or even black, and odour that of decaying animal matter. The colour of the urine is greatly dependent upon the stage of the disease, as inducing oxidation of the iron which accompanies the blood, and also degeneracy of the whole blood material. Such urine, allowed to stand at rest, deposits a copious sediment in which the presence of epithelial cells, oxalate of lime, and certain triple phosphates are present. Albumen is already detected by the usual tests, and iron in variable quantity; but, as a rule, the inorganic constituents of the blood, upon which so much stress has been laid, are really much below the normal standard: the whole progress of blood manufacture has been suspended, therefore they cannot be present in normal quantity.

Treatment.—The proper course is to attempt the removal of all undigested and indigestible matters from the stomach, as causes of the disease, and promote the healthy functions of digestion and assimilation. For this purpose the stomach which contains the offending causes should be acted upon as briskly as possible. Such remarks, it must be understood, apply only to the earlier stage of the malady. For a full-sized cow, the following proportions may be given :

RECIPE NO. 28.

Take of Epsom salts	16 to 24 oz.
Calomel	1 to 2 drs.
Croton	15 to 30 drops.
Gentian and ginger, of each	1 oz.

Mix : administer with plenty of fluid. Warm water injections are also called for, and should be regularly used.

The subsequent treatment of this disease is frequently the most perplexing. The discharge of discoloured urine may continue, and depression become very great. Under these circumstance, stimulants must be used judiciously and alternately with astringents, in order to check the passage of blood material through the kidneys. It also happens in some instances that the animals are not seen until the urine has acquired a dark or black colour, and prostration is fast approaching. The subjoined form may be adopted :

RECIPE NO. 29.

Take of aromatic spirits of ammonia	2 or 3 oz.
Powdered opium	1 dram.
Catechu	2 ,,

Mix, and administer in cold linseed mucilage. In three hours the same quantity of ammonia may be given in the mucilage, omitting the other ingredients; but at the expiration of six hours the whole of the dose will be required.

The alternation of astringents with stimulants must be carried out in accordance with circumstances; but in all cases when the purgative could not be administered at the outset on account of the general weakness, it is advisable to administer

it as soon as possible after the return of strength will admit. For this purpose from one to two pints of linseed oil may be given, and with which stimulants may be administered.

For further formulæ for astringent medicines the reader is directed to consult the article on "Traumatic Hæmaturia." In some instances, sulphuric acid proves highly beneficial, and may be given in the following proportions:

RECIPE No. 30.

Take of sulphuric acid	1 to 2 drs.
Tincture of cardamoms	2 oz.
Infusion of quassia	½ pt.
Water	1½ ,,

Mix: to be given morning and evening.

The skin of cattle should be cleansed by frequent brushing, alternate sponging, and drying with friction, and clothing. The Roman bath is valuable when practicable.

As soon as the bowels will admit and the discharge of urine is corrected, tonics are required in order to create a more active assimilation.

RECIPE No. 31.

Take of solution of perchloride of iron	1 or 2 drams.
Infusion of quassia	½ pt.
Essence of ginger	½ oz.

Mix, and administer morning and evening.

In all cases a change of diet is absolutely necessary, which must be supplied in a digestible form and in small and repeated quantities. When the animals are housed, scrupulous attention must be given to cleanliness and ventilation. The best drink throughout is large quantities of linseed-tea, and with which the medicines may be copiously mixed for administration.

SIMPLE OR IDIOPATHIC ALBUMINURIA.

We have dealt with this affection under the head of "Functional Disorders" of the kidneys, in Section V. It is nevertheless to be regarded as a disease of the blood, the common

cause of mismanagement and continued errors of diet, such as sudden changes from bulky and innutritious food to other kinds more concentrated and nutritious, and causes which pervert the nutritive and assimilative functions. In this respect it may be viewed as the antitype of asthenic hæmaturia, as not being due to direct impoverishment of the blood, but, on the contrary, to a superabundance of nutritive elements insufficiently elaborated, or from some cause incapable of being transformed into a state capable of building up the tissues of the body. They are, therefore, discharged by the kidneys in a form of albumen, however, which lacks most of the usual character of that substance.

MALIGNANT SORE THROAT.

This affection is know as *Œdema glottidis,* and observed as a fatal disease among cattle and pigs. In the latter it is known as Quinsy.

FIG. 32.

Nature.—Malignant sore throat consists of a rapid effusion among the tissues composing and surrounding the entrance to the windpipe (glottis) in which life is jeopardised by interfering with respiration.

Symptoms.—These usually comprise the signs already enumerated under "simple catarrh," to which are added others of great urgency, as great difficulty of breathing, which borders on suffocation as the disease advances: the swelling, at first internal, soon manifests itself in the parotid glands upon each side of the throat, beneath the ear (Fig. 32), and which assume

great dimensions. The pulse becomes rapid, numbering upwards of one hundred beats, and is soon small and feeble. The membranes of the nose and eyes assume a dark crimson or purple colour, breath fœtid and eventually intolerable, countenance haggard, mouth open, tongue protruded; and thus gasping for breath, the creature falls, suffocates, and dies. A convulsive cough is frequently present, and the membrane of the mouth and tongue is quickly covered with purple or livid spots, from which the epithelium is thrown off, and parts beneath are apt to become gangrenous. In pigs the swelling frequently extends to the fore extremities, and a stiff gait, with dulness and loss of appetite, are manifested in the first stages.

Post mortem Appearances.—The mouth, together with the larynx and pharynx, tongue, &c., are swollen, and their surfaces covered by ulcerated spots and discharges of a putrid nature. The salivary glands are considerably enlarged, and throughout their structure, as well as the contiguous tissues, a great amount of effusion has taken place. The brain and *medulla oblongata* are also more or less affected, and the lungs are congested.

The duration of the disease may vary from a few hours to three or four days.

Treatment.—In the early stages, during constipation, laxatives are needed, when the formula No. 12, page 64, may be used. During diarrhœa the draught No. 11, page 59, should be given. The mineral acids are of great value in this affection, and should follow the above at regular intervals. Recipes Nos. 20, 21, 22, page 79, with their directions, as given under "purpura hæmorrhagica," may be adopted.

At later periods, when the symptoms are urgent, tracheotomy must be performed at once to prevent suffocation, and a tube inserted in the windpipe. It is effected as follows:

The animal is secured by an assistant, who takes charge of the head, and holds it in such a position that the nose is raised and extended, and the lower side of the neck put on the stretch. Towards the upper part, where the windpipe is found to be most

superficial, a longitudinal incision, about two inches long, is made through the skin, dividing the muscles, and exposing the trachea or windpipe. A tenaculum is then pushed through the intercartilaginous tissue uniting the rings at a central point,

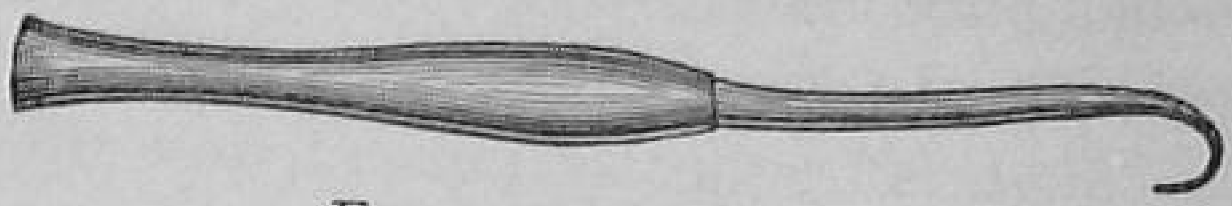


FIG. 33.—*Tenaculum.*

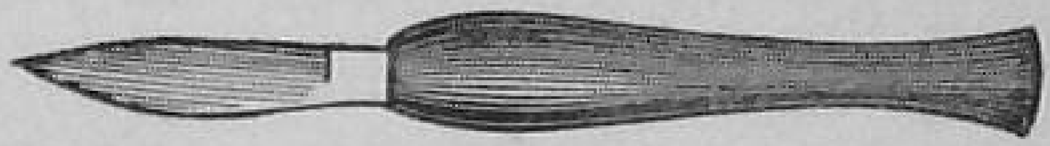


FIG. 34.—*Scalpel.*

and by means of a scalpel, sufficient is cut out to admit of the introduction of a curved tube, as seen in the engraving. A strap put round the neck secures the tube in its place, but some practitioners use one that is self-adjusting. Each

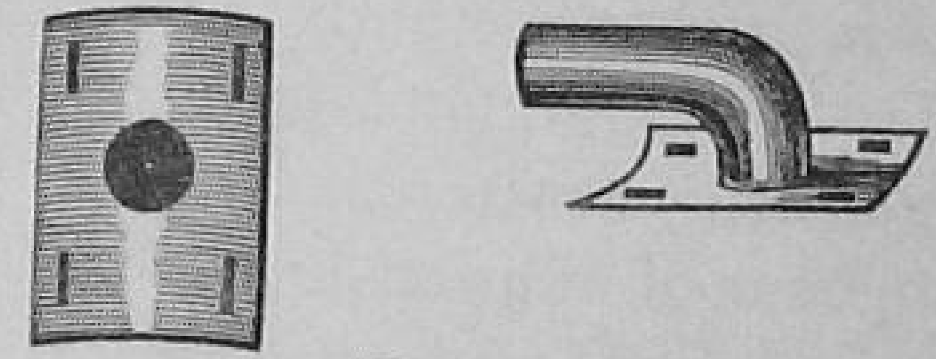


FIG. 35.

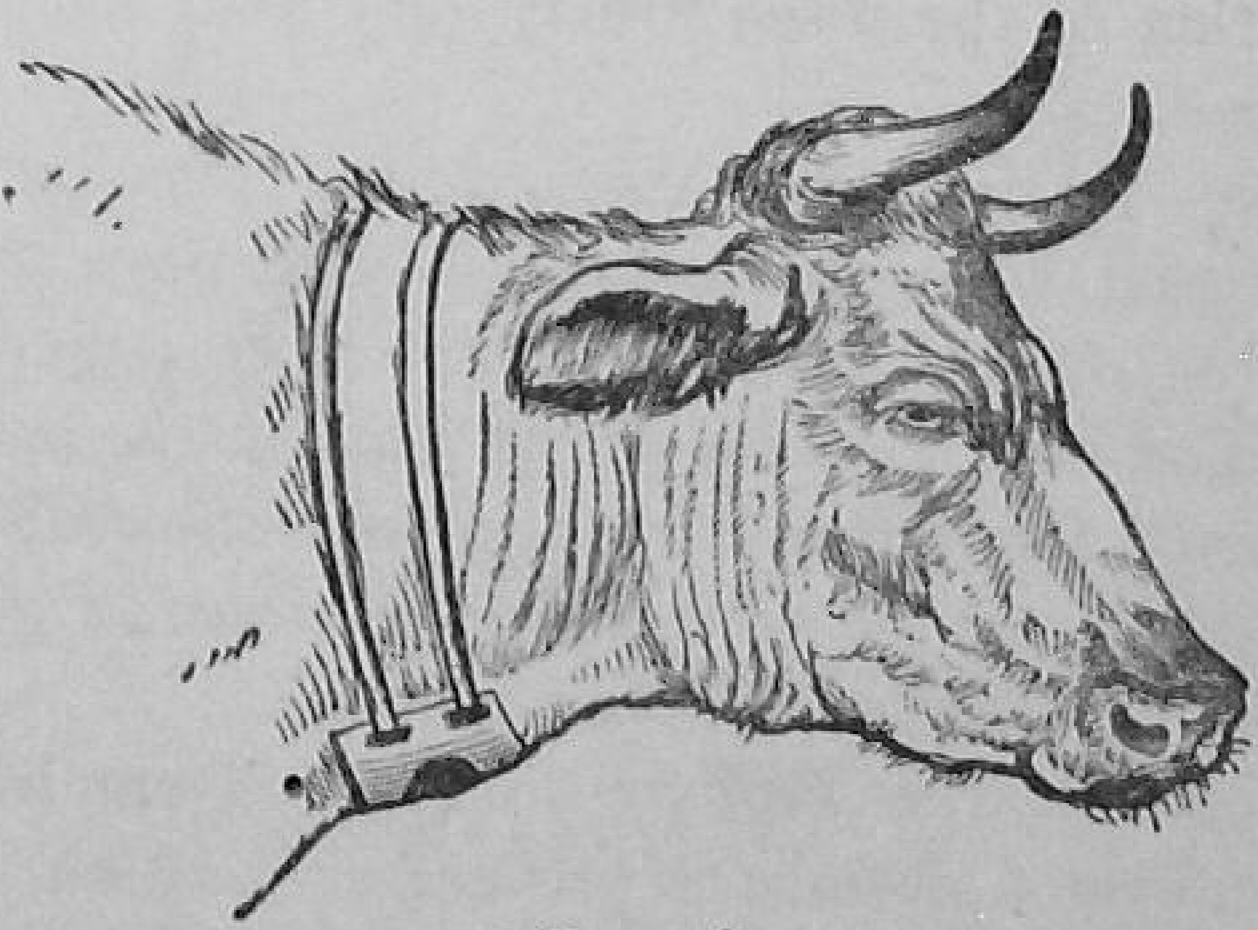


FIG. 36.

day it must be removed and the parts cleaned, an antiseptic lotion being used for the purpose of destroying fœtor. Condy's Fluid will be found to answer most purposes.

It is not unlikely that, even after relief is obtained by opening the windpipe, the inability to swallow will totally prevent the administration of medicines. The practitioner will then endeavour to act by means of what is known as the endermic method; that is, by injecting the remedy beneath the skin by means of a syringe armed with a hollow needle, as shown in

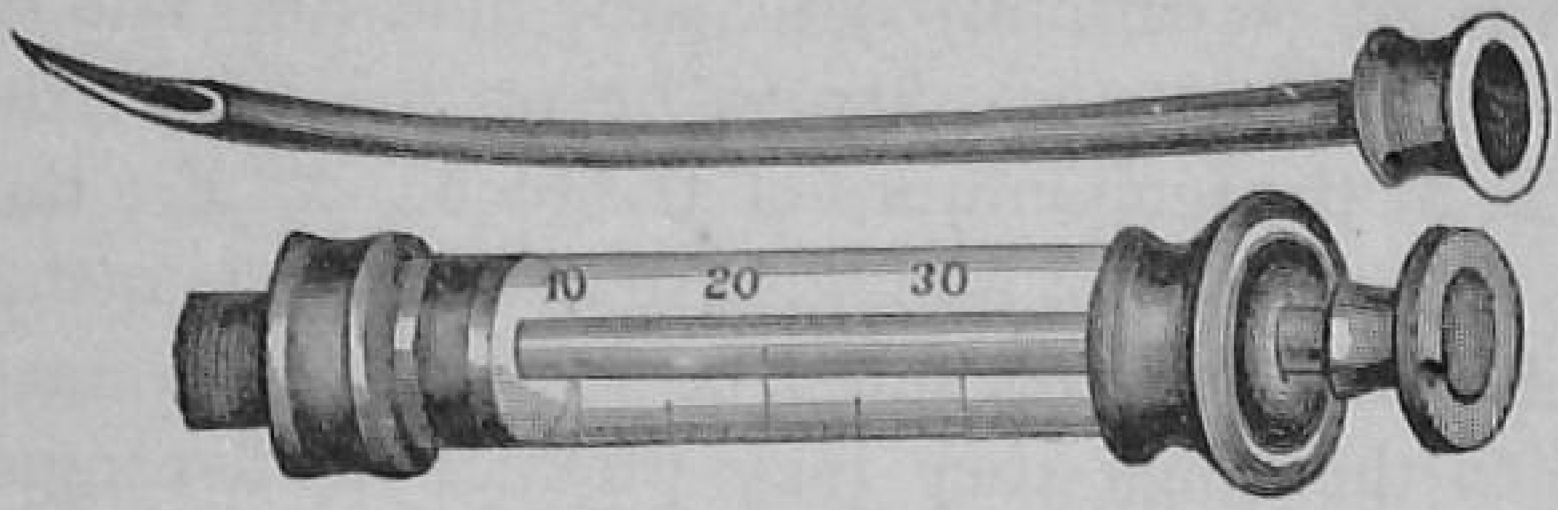
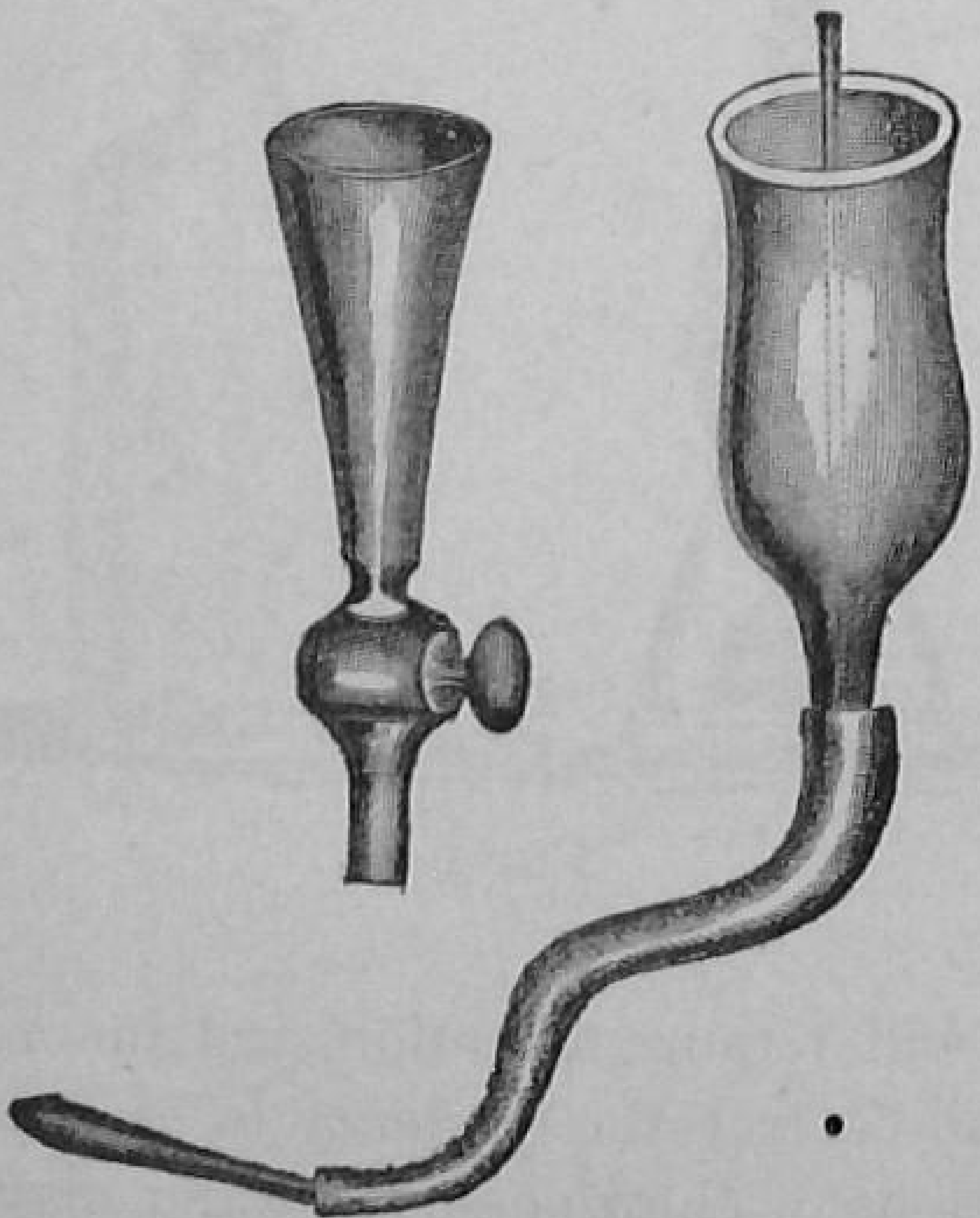


FIG. 37.

the annexed woodcut. It may also be required to inject them at once into the circulation, when for that purpose the jugular



FIGS. 38 AND 39.

vein is opened, and a glass syringe is made use of, as shown in Fig. 25. A more serviceable intstrument is given in Figs. 38 and 39. It consists of a funnel provided with a stilette or stop-

cock, to prevent the passage of fluid until the desired time. At the lower end a piece of flexible tubing about a foot long is fixed, and this terminates in a thin ivory or bone pipe three inches long. The vein is opened, and the ivory tube inserted *downwards;* the tube is supplied with the required medicine, and on turning the stop-cock or withdrawing the plug or stilette —which must be carefully done—the fluid runs into the vein.

The precautions necessary to be observed are: the fluids should be at the temperature of the blood, 99° F.; they must be very dilute, and not administered in too large quantities at once; all solid particles must be scrupulously avoided, as by passage to the lungs they may produce rapid congestion of those organs.

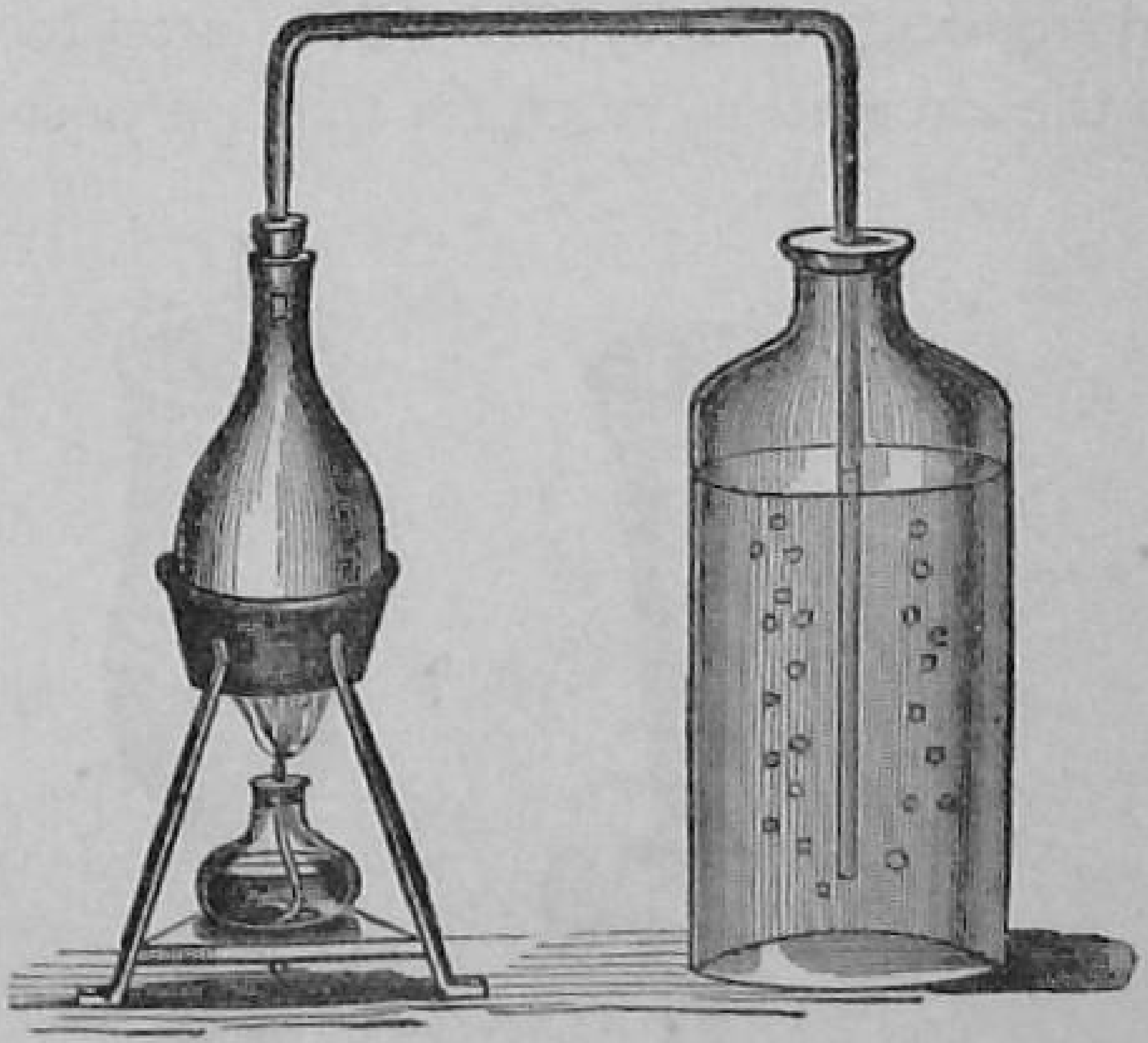


FIG. 40.

The mouth will require attention, and in order to reduce the swelling and correct the tendency to early ulceration and gangrene, solutions of chlorine gas in water may be used. A description of the annexed wood engraving, and the process for making the solution will be found under "Preventive Measures" at the end of Section II. Condy's Fluid may be injected by means of a syringe, or the wash No. 34. As soon as the creature can swallow medicines may be given by the

mouth, but the greatest care is required. Food must be good and easily digested; sound corn should be boiled, as barley, malt, peas, &c. Oatmeal, barley-meal, ground malt, &c., in the form of gruel, creed linseed, and hay-tea are serviceable fluids. The action of the skin should be promoted by friction and clothing, and domestic comfort of every kind furnished by the proprietor.

The flesh and blood of animals dying from malignant sore throat are very poisonous to others that partake of them. Horses, dogs, and pigs, supplied with either uncooked, have rapidly succumbed to putrid fever, with great swelling about the fauces. Butchers and others skinning and cutting up carcases affected with this form of blood disease, require to exercise caution if raw surfaces are upon their hands or arms. The safest plan is to bury deeply the whole body without taking off the skin, the opinion of a veterinary surgeon being obtained to certify the disease from the outset if possible.

Further observations on these particulars will be found under the head of "Enzoötic Diseases."

C.—DISEASES ARISING FROM PECULIARITY OF CONSTITUTION OR DIETETIC ERRORS, &c., OFTEN ENZOÖTIC AND HEREDITARY.

There are several affections which properly come under this head. Their principal characters point to an origin in errors of dietetic management, peculiarity of soil, and geological formation, &c. The causes are thus widespread, and from which the diseases not unusually assume the nature of enzoötics; their influence, too, upon the animal economy is such as to develop hereditary tendencies, producing serious inconvenience, and often enormous losses among young stock.

Ergotism.
Goitre, or Derbyshire Neck.
Rickets, or Softening of Bone in Young Animals.
Fragility of Bones in Cows.
Tabes Mesenterica, or Pining in Young Lambs.
Enzoötic Myelitis, or Hydro-Rachitis in Sheep.

Ergotism.

This disease is now conspicuous by its comparative rarity. In days long past, when agriculture and all that pertained to it were in a backward condition, it was not an uncommon occurrence when cereal crops were subject to an attack of ergot, and the poisonous effect upon the whole stock of a country spread with the malignancy of a plague. The absence of sunlight, with prevailing warm fog or damp were sure indications of the untoward event. In the present day the same causes still operate, and when other conditions are favourable, ergotism prevails, but happily in a much milder form. The effects are

seen in man occasioned by the ergot being mixed with bread, and in animals as a result of their feeding upon the diseased dry fodder, &c., or growing crops. In some backward districts of the Continent ergotism is still as rife as ever, but in Great Britain its appearance is fortunately reduced to a minimum by the greater attention paid to husbandry. Ergotism is known by its various effects upon the brain and nervous system; on the extremities, and lastly, on the womb.

Ergotism Affecting the Nervous System.—The animal exhibits an unsteady gait, with dulness and an evident want of power to execute the usual movements; there is great inclination to lie, and if permitted he is likely to become totally oblivious to external things; the pupils are dilated; general coldness of the surface, and the hair is devoid of gloss. These conditions may gradually pass into complete paralysis and insensibility, death following without violent nervous excitement. In other instances there is much spasmodic action of the muscles, not unlike that of tetanus and even epilepsy, and the animal is inordinately excitable. Such exaltation of nervous power is shortly succeeded by rapid decline or relapse to stupor, drowsiness, apparent weakness of the limbs, as shown by doubling or knuckling at the fetlocks, and finally paralysis. Sometimes death occurs within a few hours, or it may be delayed to several days; and other cases assume a chronic state, the animal enduring alternations of excitement and stupor, and is finally overcome by want of food, owing to spasm of the pharynx, and diarrhœa, death terminating in convulsions.

Ergotism Affecting the Extremities.—The signs of nervous disturbance already described, do not always precede this form of ergotism. The limbs first appear tender, hot, and swollen, and there is lameness; this may be limited to the hind or fore, but usually the former are only affected. The ears and roots of the horns or the tail are also the points of attack. Coldness and insensibility rapidly follow, the limbs, &c., becoming dry and hard, having a *horny* feel, which indicates death of the tissues even to the bones themselves. The swelling and tenderness is meanwhile ascending the limbs to the body, and the

line of demarcation between the two states is decided by a circular crack in the skin. If the animal possesses strength to live to this stage, the affected limbs separate at the line alluded to and wholly drop off.

These cases are usually confined to the winter months, when cows, &c., are confined to the house, and are fed upon hay, the produce of land on which ergot has prevailed during the previous summer. From this circumstance ergotism of the extremities may be confounded with and mistaken for frost-bite. The indications are, however, pretty clear. Frost-bite attacks superficial parts—as the tail, ears, &c.; but ergotism, on the other hand, penetrates to the deeper seated structures, and involves the feet.

Ergotism of the Womb.—This subject will be found in Section VI, where it has been treated at some length.

Treatment.—The mildest forms when seen in very early stages only are amenable to remedial treatment. The digestive organs should be cleared of the offending food by means of laxatives, and substitute wholesome grain and fodder, with judicious supplies of roots, tubers, and green food. Stimulants are needful during stupor, ammonia, nitrous ether, valerian, &c.; and during the nervous excitement, belladonna, opium, chloroform, chloral hydrate, nitrate of amyl, &c. To the affected limbs stimulating liniments may be applied, alternated with warm poultices, also containing camphor or similar agents.

Preventive Measures.—The first course is to withhold all supplies of affected hay or grain from animals as yet free from attack. If this cannot be entirely done, reduce it to very small supplies, combined with a liberal use of roots, tubers, &c. To prevent hay from being ergotised, mow before seeding. If the ground is known to be contaminated, use it for other crops for a time. Dress the seed with solutions of sulphate of iron, sulphate of copper, or bisulphite of soda, afterwards mixing sufficient quick lime in powder to dry the whole preparatory to sowing.

GOITRE—DERBYSHIRE NECK.

Goitre is a disease common to man and animals. It consists of an unsightly enlargement of the *thyroid body*, which is situate at the upper part of the neck, due to the superabundance of calcareous salts in the water of the locality. Its frequent occurrence in Derbyshire has suggested the title given above; but its prevalence is not confined to one particular county, or to England alone, as it is common to Switzerland and other places on the European Continent, certain districts of India, also New York and Pennsylvania. Goitre is, therefore, a disease entirely due to peculiarity of geological formation, affecting the system through the water which passes over the magnesian limestone. In some of the valleys, at some distance from the rocks and mountains of the above named formation, the disease is also known to occasion similar inconvenience, owing to the exclusive use of water conveyed direct from thence.

The swelling commences at first at the upper part of the throat or neck, and by gradual extension involves the lower portions in front; in lambs it forms an enormous mass, which stretches from the jaws to the breastbone. Such is the hereditary tendency in sheep that the offspring frequently are stillborn, or they live but a very short time afterwards, and thus the whole fall of lambs are lost. At first the swelling is soft, or pits under pressure, but it gradually acquires firmness, and becomes extremely hard and tense. When cut into, it resembles cartilage, the substance of which is impregnated with particles of a gritty nature.

Treatment.—Remove the animals from the influence of water which flows from magnesian limestone formations. If this cannot be done, let the water be collected and neutralized by the addition of suitable quantities of the carbonates of soda or potash before stock has access to it. Rain water is a good remedy when collected in sufficient quantity for exclusive supply.

Local treatment of the disease is not so practical or successful as we could wish when many animals are affected. Iodine is the principal remedy; it should be largely given on an empty stomach, and in the form of ointment applied externally over the swelling. Reduction is the work only of long time. Weak solutions may be passed into the substance of the tumour by means of the hypodermic syringe with the view of hastening absorption, and in some instances the blood vessels supplying the diseased structures have been tied.

Preventive measures consist of the careful avoidance of water known to be impregnated with the calcareous salts, and using that which has been treated with alkalies, or rain water, if possible.

RICKETS, OR SOFTENING OF BONES IN YOUNG ANIMALS.

CACHEXIA OSSIFRAGA—"THE STIFFNESS"—"THE CRIPPLE"—FRAGILITY OF BONES IN COWS.

These diseases being hitherto regarded as due to a defective digestion and assimilation, the early prominent signs being those of a depraved appetite or dyspepsia, they have usually been described under "Diseases of the Digestive Organs." We have accordingly retained them in Section IV.; nevertheless, while yielding to that arrangement, consider them appropriate to this sub-section by reason of their well-known origin in certain peculiarities of soil and geological formation in the locality.

TABES MESENTERICA—TUBERCULOSIS—ABDOMINAL CONSUMPTION—PINING.

This is the form of scrofula or tubercular consumption most commonly seen in young animals, especially lambs. Owing to its undoubted hereditary character, numbers of young creatures are born in a state favourable for the immediate development of the complaint, or they are brought forth dead.

The disease is characterised by specific deposit of cells of variable size within a special network of tissue, being, however, destitute of nutrient blood-vessels, &c. The locality and structures invaded are the mesenteric glands, where the foreign substance may be seen in all stages, as in the lungs, &c., ranging from the small spots of primary redness and congestion to solid, hard, grey tubercle, and the large yellow plastic or soft cheesy masses, which indicate softening and formation of abscess.

Symptoms.—These are general indications of ill-health, debility of a constantly increasing nature, with loss of flesh and emaciation in protracted cases. Although the mesenteric glands are the original seat of the malady, other parts, as the lungs, &c., are subsequently and often speedily involved. Disease of this kind, affecting such important structures, affords a ready solution of the cause for such remarkable wasting and debility, which form prominent features in these cases. Swellings appear about the throat, and in the vicinity of lymphatic glands, and on the joints; the abdomen becomes pendulous and swollen. The appetite, perhaps never good, is becoming more variable, abdominal pain with diarrhœa are present, and a sympathetic cough renders the sufferer uneasy. When the disease attacks the intestines there are additional signs of profuse watery diarrhœa with an admixture of purulent matter; and by further extension to the uterus and vagina, a muco-purulent discharge will escape from the vulva, constituting what is known as scrofulous leucorrhœa. The eyes sink in the orbits, the membrames are pale, but often streaked with pink distended vessels, and the breath becomes fœtid and repulsive. Exhaustion is great, and the creature cannot stand, the breathing becomes difficult, a condition of hectic is established, and the animal at length sinks and dies.

The disease is sometimes associated with disease of the bones, when enlargements appear, and sometimes make their way through the skin; in other instances the animal cannot stand, the bones being unable to sustain the weight, from a deficiency of phosphatic material, crumble under the slightest

pressure. Further complications arise in the form of arthritis or joint-ill, and dropsical states, as navel-ill, for which, see pp. 85, . The liver, spleen, pancreas, and kidneys are also liable to be involved in the tuberculous state, when special indications are developed, which point to their seat.

Treatment.—Recoveries are extremely rare, being confined to strong subjects, and those in which the hereditary taint is not intensified by a long descent through scrofulous generations or bad management. As a rule the disease proceeds to a fatal termination, and on this account the destruction of lambs in some localities is a great and serious loss. The results of medical treatment are neither successful nor to be encouraged, on the ground that any animal having a tuberculous diathesis, and, still worse, a constitution impregnated with tubercle, is dangerous as a breeder, the offspring being inevitably doomed to contract the malady, and if slaughtered for human food there is a likelihood of the disease being communicated to mankind.

Prevention.—This consists of the adoption of all measures which insure health and vigour of constitution. Assuming that in the selection of ewes and rams, only those of sound frame and constitution compose the flock, then all influences which tend to produce debility, anæmia, &c., should be avoided, such as damp and exposed situations, excess of watery food, especially turnips, to the exclusion of more nutritive kinds. This is very essential in breeding ewes. While fresh air, sunlight, and open spaces are much to be desired in the locality of a sheep fold, pasture, &c., yet shelter is very desirable as a precaution against wind and storm. Dark, damp, ill-ventilated, and especially unclean places, must be unconditionally rejected. The needful drainage of soil is important, and the nature of the crops as food for the flock must also receive consideration. A moderate supply of grain and leguminous seeds is requisite for sheep, particularly during winter and in the breeding season; but during such times the animals should have regular exercise. There is no doubt whatever, as is shown in other parts of this work, that great

mortality takes place among sheep stock, owing to the mistake of feeding highly and at the same time depriving them of necessary movement of the limbs. Feeding should likewise be regular. This we know is sometimes difficult, owing to the failure of crops, &c., which necessitates the putting of the flock upon "short commons," and sometimes, perhaps, on inferior food. When this is done, another evil usually follows, that of making up for the deficiency by allowing an abundance of rich provender when it comes to hand. To a constitution previously weakened by want and innutritious food, such treatment acts like a poison: it is the veritable form of "killing by kindness."

All animals having long legs, narrow chest, attenuated form, ears and horns set near together, long and spare neck, pale and bloodless membranes, &c., should be avoided as breeders, and when such are present in a flock, after being certified free from disease, they should be fed in preference for immediate slaughter. The carcases of those dying from the disease, or consigned to humane slaughter on account of its ravages, are most properly dealt with by deep burial or complete destruction by fire.

As it is well known that "pining" is common to soils on the igneous formation, where the cause rests in the quality of the herbage, combined with the effects of exposure, cold, and other depressing effects on a constitution otherwise physically weak, removal to land on the sandstone, or other fertile soils, is indicated on the least appearance of the malady. In the judgment of the veterinary surgeon it may also be necessary to put the animals under a course of simple tonics, &c., and thus ward off an apparent approach of insidious and fatal disease in a number of animals.

Enzoötic Myelitis—Hydro-Rachitis—Trembling—Louping-Ill in Sheep.

This affection will be found in Section VII., where it is described, as under former convictions, as a disease of the

nervous system. For similar reasons as those already expressed under "Rickets," Section IV., we think it expedient to show its connection with the class of diseases which owe their origin mainly to causes resting in the soil and geological formation.

II.—BLOOD DISEASES OF DOUBTFUL EXISTENCE SUPPOSED TO ARISE FROM ANIMAL POISONS OF UNKNOWN ORIGIN, viz:

MEASLES—(RUBEOLA).
SCARLATINA.

MEASLES—(RUBEOLA).

Under this name several diseases of swine and other animals are included without due regard to their nature or causes. Hog cholera, and a parisitic disease known as *cysticerci cellulosæ*, are frequently confounded with true measles, as well as any affection in which the skin exhibits a morbid eruption.

Very little is known with regard to this malady. It has only been hitherto described by continental veterinarians, and no evidence is forthcoming showing its existence in this country. As noticed abroad, it consists of irritative fever, with catarrhal symptoms, swelling of the head and throat, constipation, loss of appetite, &c., &c. An irregular eruption appeared about the second or third day, which was confined to the insides of the thighs, sides of the body, face, chest, &c., and consisted of a perceptible elevation, the redness of which disappeared on pressure. In the centre a perceptible hardness was evident. After the further expiration of another day, a papulous eruption took place from the central points of hardness, and gradually, in two or three days more, the acute signs were allayed, the spots became brown, the cuticle peeled off, and perfect subsidence took place by the ninth or eleventh day, unless colic and diarrhœa set in. A peculiar odour of the skin was observed in the earlier stages. Sheep were attacked, and the

discharge from the nose was sufficient to produce the disease in others.

Pigs are also liable to this disease, and exhibit similar signs, with vomiting.

Treatment.—If measles—or rubeola, by which term it is also known—should be detected in this country, complete segregation should be carried out. The bowels require attention, and the use of mild doses of salines are useful. The action of the skin should be promoted, and all sanitary as well as domestic attention conceded.

SCARLATINA—SCARLET FEVER.

This disease, common to the human subject, is somewhat of doubtful occurrence in the lower animals. It is, however, claimed as appearing among them, and by no less an authority than the late John Barlow, an eminent teacher of cattle pathology in his day, by whom it was described in his lectures as occurring among horses and cattle. There are, however, many difficulties in the way of a universal acknowledgment of the existence of true scarlatina and measles among cattle, sheep, and pigs, a fact which forcibly points out the absolute necessity for a continued and precise mode of observation.

Scarlatina consists of an acute inflammation of the skin and mucous surfaces, associated, in the human subject, with fever of an infectious and contagious character. This peculiarity has not been yet determined among the lower animals. Ordinary fever is precursory to the general period of attack, which takes place at variable intervals between the second and tenth day of what may be termed an incubatory stage. In forty-eight hours an eruption of minute spots is seen, which form patches having a bright scarlet colour. The mucous membranes of the eyes, nose, and fauces exhibit these appearances; but, unlike measles, it rarely produces soreness of throat or catarrhal symptoms. A peculiar odour—said to be like old cheese—is exhaled from the skin, and the eruption, in favourable cases, terminates about the seventh day.

A professional friend of the Author, Mr. Charles Hunting, M.R.C.V.S., South Hetton, an acute observer, relates the occurrence of the disease in his practice among ponies employed in the collieries under his care. Others, also, have described the affection, but no evidence has been given of its contagious character. The late John Barlow said in his lectures, "When it occurs in cows, peeling of the cuticle is not always observed, and it generally follows influenza in the autumn. The local signs are present in all parts covered with thin skin and having a scarcity of hair, as the nose, axilla, udder, &c. At first a yellow tinge is observed; but as the disease advances, it merges into a blood colour. Where there is much cellular tissue, the parts swell; but the skin does not become thicker, nor is there any pain on pressure; pitting, however, is observed under the fingers."

He refers also to the state of constipation that generally ensues, and the presence of albumen in the urine, and urges particular attention to sanitary and domestic care during the existence of the disease.

It is possible that in the lower animals such modifications occur as to present variable appearances in diseases which may partake of the general characters of the questioned forms of rubeola and scarlatina, and be mistaken for them; but after the testimony of such authorities we are no longer at liberty to doubt the existence of either malady. It is much easier to question, by mere words, the existence of any particular form of disease than to prove it by demonstration and fact. Idle observers often become diligent critics, but they seldom establish a truth; at least they do not have the credit for the faculty. Among many practitioners the existence of such a disease as malignant catarrh is questioned, but still various forms of disease are often grouped under the ambiguous term "Influenza," and the same flows as glibly as ever across the lecture-table of certain teaching institutions. With such looseness we cannot feel surprised that efficiency is at a discount.

III.—BLOOD DISEASES ARISING FROM ANIMAL POISONS HAVING AN INDIGENOUS ORIGIN, NON-CONTAGIOUS, BUT PRODUCTIVE OF A SEPTIC OR FATAL PUTRID FEVER IN OTHER ANIMALS, viz.:

ENZOÖTIC DISEASES.

A.—ANTHRAX OR CARBUNCULAR FEVERS:

1. CARBUNCULAR ERYSIPELAS.
2. SPLENIC APOPLEXY.
3. BRAXY IN SHEEP.
4. GLOSS-ANTHRAX OR BLAIN.
5. TEXAN FEVER.
6. HOG CHOLERA.
7. APOPLEXY IN PIGS.

B.—ANTHRACOID DISEASES:

8. PARTURIENT APOPLEXY IN COWS.
9. AFTER-PAINS IN EWES.
10. RED WATER IN SHEEP AND LAMBS.
11. BLOOD DISEASE OF LAMBS—NAVEL-ILL.

ENZOÖTIC DISEASES.

Among the blood diseases of horned cattle and sheep enzoötic diseases are the most extensive and important. The term is derived from the Greek εν (*in*), and ζωον (*zoön*) an animal, and is generally employed in preference to that of *endemic*, to denote more correctly not only the subject in which they appear, but also with greater regard to the nature and character of the affections themselves.

Causes.—These are of two kinds, viz.:

1. *Natural Causes.*—Peculiarity of natural or indigenous vegetation; position of land, as forming parts of prolific hills or fertile valleys; geological formation, as determining an excessive richness, poverty, dryness, or moisture of soil, particularly if these extremes alternate with each other upon the same farm or estate.

2. *Artificial Causes.*—Mode of culture, as forcing land to produce crops without first giving compensating return in the shape of tillage and manure; over-stocking, *i.e.*, grazing, rearing, and breeding a greater number of animals than the land can properly support; incautious use of artificial and highly nutritious foods, combined with a want of sufficient exercise, more especially when animals are in low condition or transferred suddenly from poor food or pasture.

The natural causes present great difficulties in their removal, but the artificial causes are counteracted readily and with greater certainty.

Enzoötic diseases are *not contagious*, but under certain conditions they may be propagated by inoculation among warm-blooded animals. Next to epizoötic or contagious diseases, they may be ranked in their destructive characters, often impoverishing whole breeding and rearing districts, and bringing farmers to the verge of ruin, if the exciting causes are not counteracted. In a lecture delivered by the Author, before the South Devon and Cornwall Chamber of Agriculture, the following passage occurs in reference to the question:

"Before we quit this portion of our subject, it will not be uninteresting to note how the prevalence of disease has had its effects upon our agricultural population, as evidenced by the published statements of the Royal Agricultural Benevolent Institution. Having acted for some time as local honorary secretary, numerous applications have been made to me for influence, and I have been struck with the great number of instances in which the cause of failure, among others, has been attributed to 'losses among stock.' As far as I have been able to estimate, these have amounted to two-thirds of the whole

number. But on referring to the report we find a closer approximation to fact. It is there stated that sixty-eight candidates are admitted to the benefits of the institution, and the causes of their failure are stated as follows:

' From losses in stock, &c.		27
,,	heavy losses in farming	20
,,	various misfortunes	21
	Total	68.' "

The late Mr. Alderman Mechi said: "Look at the cause of distress assigned by the hundred and fifty decayed farmers who are now candidates for relief from our Agricultural Benevolent Institution. In almost every case 'losses by stock' are assigned as the prominent cause of failure. Within my own knowledge and neighbourhood, I might quote numerous cases."

The losses among stock throughout Great Britain are truly marvellous, and, notwithstanding very close estimates have been made, the great desire to keep matters secret has tempted the powers in high places to deny the truth. While farmers have suffered from enzoötic diseases, and in the end become ruined, free trade opened up the portals of the nation to the admission of more formidable maladies, and, where the first failed to produce destruction of peace and property, the second faithfully succeeded in both. The odium which has constantly attached itself to places where disease appears among stock, suggested an amount of secrecy than which nothing has proved more direful to the agriculturist. It prompted a system of wholesale drugging which profited nobody but the quack. It offered no opportunity for a scientific discrimination by which preventive measures might have been instituted, with the saving of thousands of animals as well as millions of pounds. What is also lamentable, little or no information was gained by which the storms of the future should be repelled. Veterinary science in Britain was but little resorted to, and, even where it was, doubtless in too many instances the bigotry and imperfect teaching of the past failed to convince the professors that even a shadow of doubt could be placed upon their judgment and

proceedings. Much of this was, however, pardonable, and subsequent awakening has been productive of great benefit. There is an intense desire to profit by the failures of the past, and it is to be hoped that the agitation which is now being made in various quarters of the kingdom will culminate in the adoption of measures which shall establish a security unknown during past years.

Blood poisoning in cattle and sheep taking the various forms of anthrax, as black-quarter, splenic apoplexy, &c., often arises from organic impurities in water, as well as in food containing an excess of nutritious element. Pastures, especially those near the farmyard, and which have been laid down many years, are often loaded with putrid elements by saturation of the soil with manure, the vegetation itself being also impregnated with the poison, the soil having lost its power of disinfection, or, in other words, the elements of putrefaction are so superabundant that the soil cannot effect a separation. But manurial products are not alone the cause by which land and water are rendered dangerous to the health of cattle and sheep, &c. In our numerous visits to large stock farms, as well as other places, we have frequently had cause to warn proprietors against the careless manner in which labourers and others dispose of the remains of animals dying or slaughtered on the premises. The decomposition of flesh and blood taints the soil, giving rise to the formation of fœtid gases which permeate to a great extent, and putrid elements, through the medium of drains, may gain access to food and water, thence conveyed to stables, cow-houses, or even to human dwellings, and thus ensure a fatal blood-poisoning of the inmates. Scarlet, typhus, and typhoid fevers are thus readily developed in the human subject; among horses, purpura-hæmorrhagica, malignant sore throat, &c., and in cattle, sheep, and pigs, the anthrax diseases we are about to consider, as well as malignant sore throat and malignant catarrh.

Of late years repeated outbreaks of such indigenous diseases have been very numerous, and of serious import. Indeed, it may be safely concluded that from this cause alone many farmers were ruined, and others so impoverished that

cattle and sheep breeding was greatly diminished, if not abandoned, and since the decade of 1842, a much less profitable plan of raising the rent by corn-growing has been followed. But in the face of this there came at once free trade with its glowing promises, and prominent also among the changes was the foreign producer with any amount of stock to occupy the vacant pastures of this country, and corn to fill English sacks, harassing the farmer on his own threshold as he was, and is, taxed to the utmost, and bound by covenants which often render him powerless against such odds. There is no question that the soil of Britain is admirably adapted for the breeding and rearing of stock, and under proper conditions would yield a greater profit than the management of land wholly arable; but to render the pasturage suitable and comparatively safe from enzoötic diseases it should not be allowed to lie too long. This applies most particularly to home pastures, fen land, and meadows where there is a rich alluvial soil. Provision should be allowed for retaining sufficient grass, while certain portions, first passing under the plough, are cropped two or three years and laid down again; by these means the natural action of the soil would be roused to assimilate the superabundant manurial elements, salts, &c., and so dissipate the cause not only of such devastating diseases as anthrax and splenic apoplexy, but also those equally baneful scourges, rot and parasitic disease in lambs and calves.

The following extract from a report of the Meeting of Council of the Royal Agricultural Society (June 1879), will prove interesting to the reader as showing how readily the anthrax poison is developed and propagated in other animals.

"Mr. Duguid, the Veterinary Inspector attached to the Brown Institution, reported that during the past quarter he had advised members of the society on three occasions, in reference to diseases of pigs; and had made two visits to the country on the application of members, one being in the case of inflammation of the lungs and bronchitis in a shorthorn heifer, and the other a case of anthrax in lambs belonging to Mr. Gaitskell, of Hall Santon, Holmbrook, Carnforth, Lancashire. On May

18th, Mr. Gaitskell wrote stating that he had lost twenty-six lambs out of a lot of ninety-four, and that three ewes had also died in the course of five days. He also sent two lambs for *post mortem* examination. The following day he sent a telegram stating that on that morning twelve more lambs and several ewes had been found dead. Mr. Duguid reached the farm on the 20th, and found the mortality still progressing. By that evening two-thirds of the lambs had died, and about twenty ewes. It appeared that Mr. Gaitskell's flock had recently been divided into two lots, and the mortality occurred in one, the other remaining perfectly healthy. The unhealthy part of the flock had been grazing for some days on land which had been newly rented by Mr. Gaitskell, and on the first few lambs dying he removed them from this land. On inquiry, it appeared that black water" [qy. "Black Quarter?"] "was not uncommon in the district, and a similar mortality had taken place among sheep on the same land last year, and some Irish cattle placed on the pasture previous to the sheep, had shown symptoms of illness after being on it a few days. Last Christmas, in opening up a drain that had been choked, portions of the carcase of a cow were found. This cow had died, and had been buried close to the drain in 1874. During 1875, the carcases of some sheep and of a mare that died were not buried at all, but left lying on the surface to be devoured by dogs, birds, &c. The history of this outbreak quite corresponded with some of the more extensive ones reported from Central Europe, which, according to competent authorities, are frequent and severe according to the mode of disposing of the dead animals. Mr. Duguid recommended palliative and preventive measures rather than active remedies, including the removal of dead animals, and separation of diseased from healthy ones, as well as small doses of purgative medicine, followed by small doses of nitre. On the evening of the 23rd, Mr. Gaitskell wrote that during the previous night, only one lamb had died, and that the whole looked much better, and some of the infected ones even showed signs of recovery."

It has long been known that the poison of anthrax is not

transmitted from the system of the mother to the fœtus. Our continental brethren, who have a great love of research and also of horrible experiment, have endeavoured to present us with the reason why.

"In the *Wochenschrift für Thierheilkunde und Viehzucht* Professor Feser publishes some interesting observations on anthrax in pregnant animals, with respect to its influence upon the fœtus. It has been established by many independent authorities that the blood of the embryo contained in an animal that has died of anthrax is not capable of communicating the disease by inoculation to other animals susceptible to it, while the blood of the mother readily conveys the contagion. Before the nature of anthrax was properly understood, attempts were made to explain this fact by the existen e of histological differences between the tissues of the mother and the fœtus discoverable under the microscope. But since Dr. Koch, of Wolstein, clearly proved that anthrax is a disease dependent solely on the presence of certain organisms, Feser adopts the view that the placenta of the diseased mother protects the fœtus from the disease, owing to the anthrax-organism being unable to pass through this natural physiological filtering apparatus. In support of this doctrine he relates the following experiment:—On the morning of November 10, 1878, a tenth of a cubic centimètre of anthrax blood taken from a rabbit that had died of the disease was injected into the subcutaneous tissue of the chest walls of a pregnant ewe, by means of a small syringe. The sheep died of the disease on the night of November 11-12. An hour or two before death the ewe gave birth to a strong healthy lamb, which was successfully reared on cow's milk given from a bottle, and remained in perfect health many weeks after. That the mother had died of anthrax was clearly shown by the results of the *post mortem* investigation, and by microscopical examination of the tissues, as also by the communication of the disease to other healthy animals by inoculation of its blood."*

* *The Farmer*, March 17th, 1879.

We, however, fail to see the matter any clearer than previous observation on diseased animals had aided us, and so far the elaborate experiment of this painstaking Nemesis of research goes for nothing. We do not grudge him the laurels he has thus won for himself.

As observed in this country, enzoötic affections are of two kinds, viz., *anthrax* or *carbuncular fevers*, and *anthracoid diseases*, or those possessing the greatest resemblance, as well in nature and cause, to anthrax itself, yet having distinctive characters.

Nature.—Enzoötic affections depend upon the production of an unnatural and dangerous plethora, which determines morbid, physical, and physiological changes in the constitution of the blood, and the subsequent development, in certain instances, of a specific animal poison therein. This specific poison is determined to be a superabundance of albuminoids imperfectly elaborated, which speedily undergo such changes as to disorganize the circulation, and render the blood totally unfit to support life. The French regard these diseases as highly contagious, and many writers in this and other countries attribute their propagation to the presence of a form of bacteriæ in the blood, &c. In all there is a remarkable tendency to passive hæmorrhages, which in true anthrax are more or less complicated with erysipelas, phlegmons, boils or carbuncles, and gangrenous states.

I.—Anthrax or Carbuncular Fevers.

1. Carbuncular Erysipelas (*Erysipelas carbunculosum*), *Anthrax of the Extremities:* known in the vernacular as *Black Quarter*, *Quarter-Evil*, *Quarter-Ill*, *Joint-Ill*, *Black Leg*, *Speed*, *Hasty*, *Puck*, *Shewt* or *Shoot* of *Blood. Inflammatory Fever* of Youatt; *Milzbrand emphysem* of the Germans; *Charbon* of the French.

Carbuncular erysipelas is very common among calves throughout Britain. It is the "Black Spauld" of young sheep.

It rarely appears in animals of mature age, the system being then proof against the morbid conditions which produce anthrax.

Nature.—Extensive sub-cutaneous extravasation, as well as general infiltration of blood and lymph beneath the skin, &c., and ecchymosis as a result of blood poison.

Symptoms.—All the forms of anthrax are remarkable for the paucity of premonitory signs, except as far as the condition of plethora is concerned. Usually, the first intimation is the discovery of one or more dead carcases in early morning. When opportunities for observation occur, the signs are as follow: Costiveness, frequently attended with bloody stools *(proctorrhœa)*; deficient and highly-coloured urine, slight excitement, protruding eyes, and injected visible membranes; hot mouth, slight frequency and fulness of the pulse, and accelerated respiration. These constitute the *first stage*, and are seldom noticed.

FIG. 41.—*Carbuncular Erysipelas—Black Leg or Quarter Ill.*

Second stage.—Lameness or stiffness is now added to the previous signs. Respiration and circulation are notably disturbed, the pulse being full and rapid. The head and neck are protruded, eyes bloodshot, appetite lost, intense thirst is present, the urine is darker in colour, and the creature stands gloomily away from all his companions. Lameness increases every hour; other signs also rapidly suffer aggravation, and the animal utters low moans, particularly when disturbed. Diffused emphysematous swellings (containing air) appear upon the sides, quarters, or extremities, which crepitate, or

crackle like tissue-paper, when the hands are passed over them.

Third stage.—The power of standing is lost, breathing difficult, and the pulse is small, feeble, or imperceptible; swellings have increased, and the sufferer lies upon one side with outstretched neck, the stomach painfully distended with gas (*hoven*), tongue protruded, eyeballs retracted and covered by the haw (*membrana nictitans*).* The ears, horns, and extremities are cold, and insensibility (*coma*) and death speedily follow, the whole train of symptoms frequently terminating within twelve hours.

In rare and protracted cases the animal continues for several days, when opportunity is thus given for the swollen parts to slough extensively, and smaller but analogous spots to appear on the tongue, buccal and other membranes, which at first form apparent blisters, and afterwards slough, exhibiting large and very angry looking ulcers, having tardy healing powers.

Post mortem Appearances.—Emphysema (air) in all available spaces beneath the skin and membranes, muscles, and in all closed cavities, as a result of early and rapid putrefaction, by which the abdomen is greatly distended. Black exudations of blood form extensive patches, which, in some cases, may be confined to one limb or quarter. Similar exudation also occurs between muscles which are more or less gangrenous, the vessels of the locality being in a state of extreme turgescence; the blood, however, being dark and fluid. The lungs are congested, one, the lowest, being always the worst; frothy mucus almost fills the bronchial tubes, extensive ecchymosis covers the serous membranes, and free transudation occurs beneath this covering in many organs; the heart is soft, flabby, and filled with blood which is black and semi-fluid, and numerous blood-stains are seen, formerly believed to be an evidence of inflammation. Cadaveric rigidity is slight, and observed only immediately after death.

Treatment.—The great secret in diseases of this kind is to

* See Fig. 330.

limit or destroy the power of the operating cause. The extreme rapidity with which this disease runs its course permits of no lengthened or precise plan of curative treatment. The former remedies were bleeding largely, with purgation; but experience has unmistakably shown that these, whether separately or combined, hasten the end of life. Among the medicines that have been used there is no great degree of preference, for the reasons already mentioned; these are alcoholic and fermented fluids, as whisky, gin, brandy, beer, &c., with which various strong aromatics are mixed; the vegetable and mineral acids, oil of turpentine, camphor in the solid form, as well as dissolved in spirits, acetate of ammonia, spirits of sal volatile, fœtid spirits of ammonia, &c., &c., and alternately with them also opium, tannic acid, salts of iron, bitter infusions, &c. Lastly, applications to the skin, as friction, and powerful irritants, as mustard variously compounded with turpentine, ammonia, &c., the vapour bath, and cold water, as recommended by the advocates of hydropathy. All these have been unremittingly applied, but the results have been no more favourable with one than another. Usually the affected animal dies off very quickly after he is attacked, or is already dead in early morning; therefore, the efficacy of well known remedies is of no avail whatever except in very rare instances. The experience of the author extends to some thousands of serious outbreaks of the disease, and in very rare instances only has he succeeded in saving the life of an affected animal; other practitioners bear similar testimony.

The attention of the proprietor should always be directed to measures of prevention, to the saving of apparently unaffected animals, when the disease breaks out on a farm or estate, rather than in wasting time with those found suffering in advanced stages of disease. We shall here give only the necessary measures for application to stock, which have been subject to the same influences as those diseased, leaving the general treatment of prevention to be discussed in a summary at the close of this section, and which will have reference to this class of indigenous diseases.

Setons are productive of great good as long as they promote a discharge of pus. They should be inserted lengthwise—from above downwards—in the neck, terminating at the bottom of the dewlap, lying merely below the skin, the points of ingress and egress being at least ten or twelve inches apart, and the tape secured at each end, as shown in Figs. 7 and 8. Such setons we have known to remain three months, and if other means are scrupulously observed, they generally prove successful. During later years the practice grew into disrepute, as many proprietors thought the dewlap was disfigured, and thus safety was sacrificed for appearances; but always in the absence of direct knowledge, or means of averting the true cause of the disease, and these are seldom made out at once, we urge the safe practice of using the seton.

In the shape of medicines the young stock should receive daily allowances of one or other of the neutral salts in manger food, or occasional laxative doses of purgative salts may be given if preferable, and these are to be continued while the disease appears to be rife in the neighbourhood. A moderate abstraction of blood is practised by some, but we have not so much faith in the proceeding, if the animals are strong, vigorous, and in high condition; we should rely upon the medicine more certainly. If, on the other hand, a herd of young animals, only in moderate or poor condition, exhibited signs of the disease after being turned upon rich land, it would be judicious to bleed, as much better results would be gained (see Plethora). The next thing is to place the animals upon a less rich pasture for a time, or drive them morning and night to and from the yard to grazing land at a distance, to ensure the exercise of the limbs and create a proper assimilation of food.

It seems almost a useless proceeding to recommend the treatment of animals labouring under an attack of carbuncular erysipelas; nevertheless there are occasionally instances in which the suffering creature is either not so seriously affected or the strength of constitution appears to be able to throw off the poison of the disease, and signs of recovery are exhibited. Under such circumstances the most advisable course of treat-

ment is to administer stimulants in order to prevent the tendency to collapse. For this purpose such as the following is recommended:

RECIPE NO. 33.

Take of spirits of nitrous ether	1 or 2 fluid oz.
Powdered gentian and ginger, of each	1 oz.
Water	10 to 20 fluid oz.

Mix: and give as required, probably from four to eight doses being administered in the course of twenty-four hours.

If the bowels are constipated, it may be advisable to give a dose of linseed oil with one of the above draughts, and clysters should be used conjointly.

Fresh air and absolute cleanliness, with total separation from all other animals, is of the greatest importance. Further particulars on this and other heads will be given in the general summary at the end of this section of diseases.

When the mouth is sore or blisters form, the latter may be opened by a lancet, and the parts should be dressed, washing them two or three times a day with such a mixture as the following:

RECIPE NO. 34.

Take of alum in fine powder	2 oz.
Sulphuric acid	2 drs.
Tincture of myrrh	2 oz.
Water	1 qt.

Mix the powder and water together, and add the acid; when dissolved, put in the tincture, and it is ready for use.

Abscesses require opening as soon as pointing appears, and the resulting wound, together with all ulcers, must be kept scrupulously clean, the most suitable dressing being the following:

RECIPE NO. 35.

Take of pure carbolic acid	2 drs.
Pure glycerine	1 oz.

Mix and dissolve, then add

Carbonate of soda	½ oz.
Water	10 fluid oz.

The mixture is then ready for use.

A common remedy employed by the cow-leech, as a preventive and even cure of "black quarter," is the operation of nerving (?). For the practice of this imposture, hundreds of pounds are annually drawn from the pockets of agriculturists. The effects derivable are no better than those from a common seton, the *modus operandi* of which can be understood more readily. The so-called operation consists of casting the animal and securing the limbs in succession to an iron bar driven into the ground, and, after an incision has been made above the cleft of the hoof, either a vein or part of a ligament is cut out, and this is by some termed a worm and by others a nerve. Plethoric animals thus punished will not move about much from the pain they suffer, they therefore get no food and are reduced—the whole secret of the proceeding. A seton placed in the dewlap, of sufficient length from above downwards, with change of pasture and medicines when required, is not only the most rational treatment, but an honest one. It surely performs all that can be required from it, and is safely employed as a slowly acting derivative. When the operation is recommended for the prevention of carbuncular erysipelas, the proprietor may be satisfied of its utility and honesty. These qualities cannot be guaranteed by the fraudulent operations of "worming" and "nerving." The men who recommend and practise them seek only personal gain, which they secure from the direct losses of the farmer.

2. SPLENIC APOPLEXY (*Apoplexia splenitis*); *Blood-striking* in the vernacular; *Milzbrand* of the Germans; *Sang-de-rate* or *Maladie-du-sang* of the French.

This affection is common to cattle and sheep, but most frequently seen in the former when put up to fatten. Occasionally young cattle are seized when out at grass, but this is somewhat rare; indeed, splenic apoplexy appears essentially a disease associated with a higher or more complete development of anatomical and physiological power, that form of charbonous fever last described being generally confined to

young growing stock. While it is a rare occurrence for young animals to be seized with splenic apoplexy, it is equally rare for older or mature animals to suffer from carbuncular erysipelas or black-leg, by which term it is more familiarly known.

Nature.—Splenic apoplexy is a blood poison, probably due to the admission of septic material having gained access to the system by means of food or water, running a rapid and always fatal course, and that frequently without the appearance of any observable sign, giving rise to peculiar local and internal manifestations which form its distinguishing characters. Some pathologists have considered that the ever constant presence of animalculæ in the blood in this disease is the probable cause; but later investigations have shown that in other conditions, as well as charbonous disease, these so-called bacteriæ are present.

Symptoms.—Premonitory signs are few and frequently unobserved. Animals are supposed to be in perfect health at night, but one or more are found dead next morning.

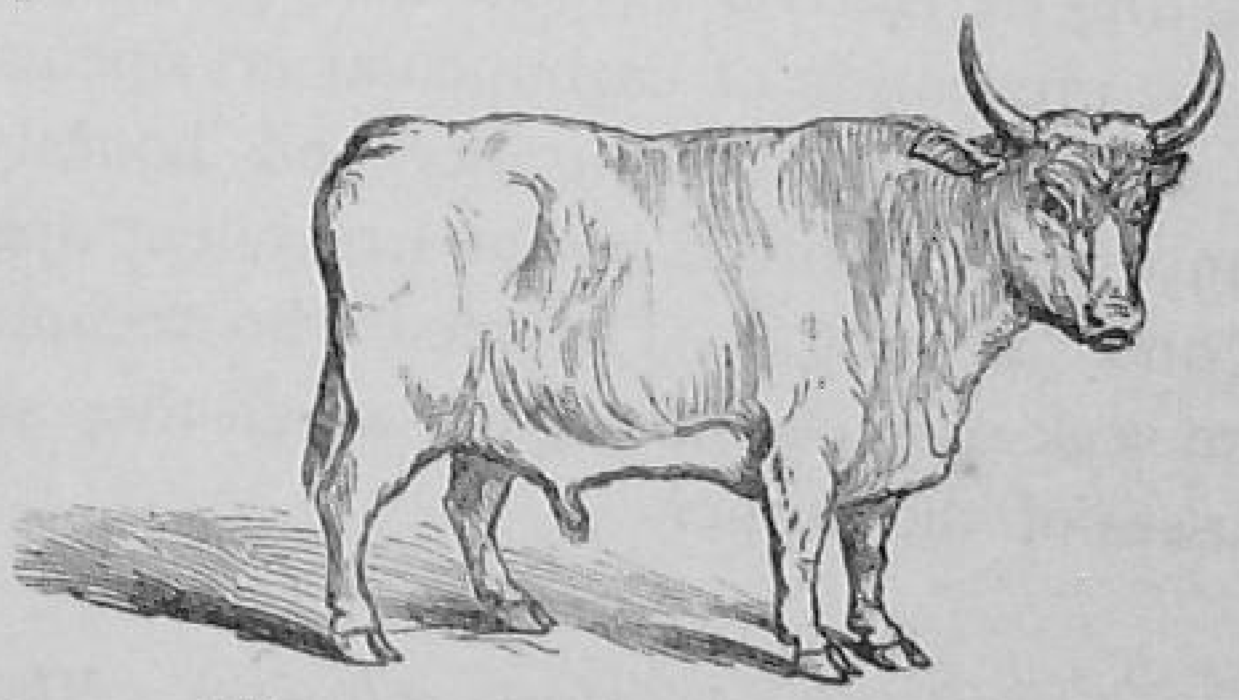


FIG. 42.—*The common subject of Splenic Apoplexy.*

In some rare instances the disease is not so rapid, when the following may be observed:

First stage.—Excitement, prominent eyes, visible membranes reddened, mouth hot and dry, urine and fæces deficient, dry and hard, pulse somewhat rapid and wiry. These may be observed during one day, but on the succeeding they are decreased, or so slightly marked as to escape observation; and thus several days may pass with these alternating exacerba-

tions of more or less slight remitting fever, the animal in the interval assuming somewhat the usual appearances of health. At length the malady, which has been gathering force and intensity, is betokened by further signs, as follow, which succeed so rapidly that the division of stages is not always to be clearly defined.

Second stage.—Uneasiness, colicky pains, back arched, pulse more frequent, smaller, and harder, respiration accelerated and short, and the animal seeks support by leaning against the nearest object. The bowels now discharge hard and dry pellets of dung, thickly covered with mucus and blood, attended with straining.

Third stage.—Respiration short and roaring or stertorous, pulse small, feeble, and more or less indistinct or imperceptible; the animal drops and is seized with convulsions; red froth and mucus escape from the nostrils; he struggles violently, bellows, and moans; general coldness comes on, the whole of the signs are considerably aggravated, and death ensues in periods varying from two to twenty-four hours.

Post mortem Appearances.—Early and rapid decomposition proceeds in every part of the body, cadaveric rigidity transient, abdomen and areolar (or cellular) tissue beneath the skin distended by gaseous emanations; subcutaneous infiltrations of blood; much serum, sometimes blood also, is found within the abdominal cavity; spleen enlarged or ruptured, and weighing in the ox 10 to 15 lb. (proper weight, 2 to 3 lb.), in the sheep 12 to 20 oz. (in health, 2 or 3 oz.); extravasation of blood more or less throughout the intestines, and the fourth compartment of the stomach (*abomasum*) is highly coloured; blood-stains are frequent, and ecchymosis pervades the whole serous membranes, and even the substance of the organs they invest. The pericardium (heart-bag), membranes of the brain (particularly the arachnoid), with the ventricles, contain an excess of fluid; the bladder is full, and blood-stains appear upon the outer part, with ecchymosed spots.

Treatment.—The remarks that have been made in reference to the treatment of black quarter apply very much to this

affection. Numbers of animals die notwithstanding the treatment adopted at the late stage in which the veterinary surgeon sees the case. Whenever the disease appears, he should be consulted with regard to prevention, which would prove a highly profitable proceeding in many localities. When, however, there is time for remedial treatment, it should be commenced by dashing cold water over the head, and administering a stimulant composed of the following:

RECIPE NO. 36.

Take of spirits of nitrous ether	3 fld. oz.
Gentian and ginger, of each	1 oz.

Mix, and give when the strength appears to be flagging, or at regular intervals after other remedies. When the bowels are constipated linseed oil, to the extent of two, or even three pints, may be given, as called for by reason of circumstances, and clysters should be diligently employed. These, with scrupulous attention to cleanliness, fresh air, regular removal of litter and its disposal by burial or thorough disinfection, together with all proceeds of the disease, as blood, mucus, &c., &c., will form the main features of treatment; but as the nature and causes of the whole of the group of diseases enumerated under the head of anthrax or charbonous fevers are without doubt the same, differing only in the mode of attacking animals of different age and species, we shall have further remarks to offer hereafter of a general character.

The propriety of bleeding is much questioned; yet some practitioners resort to it in the early stages, before the vital powers are prostrate. We do not recommend it, having a doubt about its real efficacy, and being more inclined, from experience, to direct our efforts to other and more probably successful measures.

3.—BRAXY.

The affection so termed is known only among sheep.

Nature.—A blood disorder, with remarkable tendency to

disintegration within the blood-vessels, thus leading to a direct, extensive, and fatal arrest of the circulation. It is *not* an inflammatory disease; and it may appear that the pure anthrax poison is not always developed, as the frequent consumption of braxy hams in Scotland suggests. On this head, however, too much credence must not be given, as some allowance must be made for the effects of salting and cooking. The victims are those animals in a vigorous condition, and are usually found dead after clear moonlight nights or on cold frosty mornings.

Symptoms.—As in the blood diseases already described, there are in this but few signs that indicate the fatal consequences that ensue. Those which have been noticed are bloodshot eyes, accompanied by a strange and excited appearance; full and rapid pulse; accelerated respiration; hot mouth, limbs, and body; costive bowels; urine deficient and highly coloured; with a peculiar staggering gait, indicated by a short step. They next exhibit signs of colic—lying down and rising, uneasily; otherwise they separate themselves from the flock, and stand persistently with the head depressed and the back arched upwards, the ears hang down, the fleece is "clapped" to the skin, the eyes are dull and the abdomen swollen from the disengagement of gas within the bowels. In somewhat later stages of the more protracted cases, or from the first in the more violent form, there is pain in straining to void fæces, which are black, scanty, and accompanied with mucus and blood. The wool has suddenly become dull and "clapped," and has lost its soft and unctuous feeling; the heart throbs violently, and colicky pains disturb the animal between the more severe paroxysms, and sudden insensibility follows, death succeeding to distressing fits of violent convulsions. Sometimes the animal is standing, or has just risen, when the final struggle between life and death ensues: he then throws his head upwards and backwards (Fig. 43), the fore legs refuse their support, and the sufferer falls forward, and, after more or less painful struggles, dies. Thus the affected creatures, after leaving the flock, wander some distance, and are found either fallen

into a ditch or at the bottom of a deep chasm, and the first idea associated with the fact is that they have been drowned or mutilated by the severe fall over the rocks. The true cause does not remain long a mystery, for other deaths speedily follow, and a simple investigation convinces the proprietor that he has again to face his old enemy of the flocks. It is said that in some of the more protracted cases the falling and dryness of the wool, accompanied with the peculiar short step in walking, may be noticed before any other signs are present. ("Transactions of the Highland and Agricultural Society, 1863.")

The shepherd recognizes two forms: these, described in his usual phraseology, consist of *Dry Braxy*, and *Dumb* or *Water Braxy*, which are decided by the presence of constipation or diarrhœa.

FIG. 43.—*Sheep in the last stage of Braxy.*

Some cases are characterized by lingering fever, in which most of the acute symptoms are absent. Putrefaction sets in before death. When diarrhœa is present, the paunch swells as seen on the left side; with constipation, the gaseous distension is chiefly sub-cutaneous, *i.e.*, located beneath the skin, when pressure produces the characteristic crepitus or crackling.

Post mortem Appearances.—All the manifestations of rapid decomposition are present; fœtid emanations escape from all parts as soon as severed; bloody froth issues from the nose and trachea; blood-vessels contain black blood; the superficial tissues are stained of a reddish yellow colour; ecchymosis and

blood-stains are visible upon and in most organs, and a red serum is present in the abdominal cavity; circumscribed extravasations prevail beneath the mucous coat of the intestines; the third stomach *(omasum)* is usually impacted; lungs congested; heart full of partly coagulated and dark blood, and is ecchymosed and blood-stained within and without.

Treatment.—Successful management of sheep stock, and their protection from braxy, is entirely a system of prevention. Hill stock should, if possible, receive a greater amount of shelter, and thriving animals be confined to the fold or a bare pasture during moonlight nights, and thus prevent their roam-

FIG. 44.—*The Facial Vein where Bleeding is sometimes performed.* The current of Blood is arrested by pressure on the lower border of the Jaw at *a*.

ing and devouring too much food. These are, however, directions that are much easier to intimate than to observe and carry out. Another point of interest is to decide how medicines can be administered to large flocks that are feeding upon the lonely hills of distant counties and suffering from braxy. Among the flocks of the more accessible regions affairs assume a less difficult character. They can be supplied with shelter unknown in the hilly districts of North Britain, where death from such a cause is most common; they can also be supplied with a change of pasture, or folded properly at required times, and induced to accept a change of food in which suitable medicaments—as preventive means—are placed. Even here, however, the rapid nature of the disease sometimes renders ordinary treatment of little moment. Animals are noticed

only when it is too late. Preventive measures are not sufficiently studied and appreciated. Rapidly thriving sheep are destitute of the necessary amount of vigilance which their value demands, and hence the disasters that yearly occur.

When cases are observed at the earliest stages, the sheep should be driven rapidly for a short distance—say fifty or one hundred yards—and immediately bled. The spot selected is the facial or jugular veins, and, as recommended by some, the vein upon the inner side of the thigh. The face offers a most convenient spot, having the least amount of wool upon it. The vein is also readily distended by pressure on the lower border of jaw at the place indicated at *a* in Fig. 44, and should be opened by the lancet between that part and the bony ridge on the side of the face.

Purgatives and stimulants are absolutely indispensable. For full-grown animals four or six ounces of Epsom or Glauber's Salts, or of linseed oil about half a pint, will be required, and gentian and ginger in half-ounce doses should also be added. Injections of warm water, soap and water, &c., are of great service in unloading the bowels and promoting their action. The proper performance of the digestive functions is imperatively called for, and little hope of success will be certain unless this is attempted in the earliest principles of treatment. For a time subsequently a less nutritious diet must be allowed, and an excellent practice consists in the administration of nitre, about fifteen or twenty grains to each animal daily. This is conveniently accomplished by mixing it with bran, pulverized oil-cake, &c. Sudden changes from poor to rich pastures should be avoided as far as possible, and the allowance of grain or artificial foods continued or commenced with great circumspection.

4. GLOSS-ANTHRAX OR BLAIN: *Zungen-krebs* or *Zungen-karbunkel* of the Germans. It is the "*Hawks,*" and "*Gargis,*" or "*Gargyse,*" of some districts.

Nature.—One of the varieties of anthrax fever usually con-

fined to cattle, but witnessed occasionally among sheep. The local manifestations are rapid swelling with development of pustules and malignant carbuncle, in which the mouth, tongue, and fauces generally suffer. It is not contagious in the sense conveyed by Youatt; but if the poison of the disease is introduced to the circulation of healthy animals, a rapid and fatal putrid fever is engendered, destitute, however, of the local characters of "blain or gloss-anthrax." The attendants of animals suffering from this malady are cautioned to exercise great care, and to scrupulously avoid their mixing with others that are healthy. Wounds and raw surfaces generally existing upon their own hands or parts that may be exposed should be carefully protected. The saliva is *poisoned* by the discharges from the ulcers on the tongue at an early stage, and these entering the body by food or a wound may cause an untimely and agonizingly rapid death. Blood and discharges from the wounds of animals thus affected have been known to produce the death of butchers, and others, even when there has been no evidence of inoculation by a wound—simple application to the skin being sufficient.

Symptoms.—Gloss-anthrax is as remarkable as all other forms of anthrax fever in its power of appearing without first exhibiting peculiar and noticeable signs of disturbance. It is frequently contemporaneous with *epizoötic aphtha.* There are extreme signs of constitutional disturbance, which quickly succeed to great depression, coma (insensibility), and death. From the mouth at first issues a copious limpid saliva, which speedily becomes purulent and bloody by the bursting of pustules that have formed upon the upper and wider parts of the tongue and sides of the mouth. These are of a white colour at the commencement, but soon become purple and even black, and by discharge of their contents expose foul ulcers, having slow and feeble healing powers.

The nose, face, neck, and contiguous parts are involved in a rapid congestion and swelling; pressure is then induced upon the windpipe and jugular vein; respiration is therefore difficult and roaring (stertorous), and the animal becomes unconscious,

and dies within twenty or thirty hours. The characters of the pulse are at first hard and rapid, but speedily become feeble and indistinct, from the great obstruction placed on the circulation and the attendant train of effects.

FIG. 45.—*Gloss-Anthrax or Blain, early stages.*

Post mortem Appearances.—The general conditions observable after death are those of anthrax fever already noticed. Extravasations of blood among the tissues occur in every part of the body; smaller spots (ecchymosis) and blood-stains are frequent, with effusion of serum in the various cavities, and rapid decomposition. The local signs are considerable tumefaction and sloughing of the tongue and mouth, with more or less gangrene or mortification of the parts, and sub-cutaneous extravasation and infiltration (dropsy) about the head and neck.

Treatment.—The remarks already given under the forms of Anthrax Fever, as far as prevention and general treatment are concerned, apply well to this affection. Bleeding should be resorted to only at the earliest stages, and the succeeding treatment will also consist of the usual stimulants with oleaginous purgatives, supplemented by clysters if required. The animal should be placed by himself in a cool comfortable shed away from all other animals, and special attendants drafted to wait upon him. Food cannot be taken, but nutritious drinks may be given, as linseed-tea, barley-water, flour or oatmeal

gruel, hay-tea, &c., &c., should be at hand, in which a little nitre is dissolved.

The pustules within the mouth must be opened by means of a lancet or the hot iron. The latter is most favourable for promoting healthy action in the sloughing parts. Afterwards the mouth should be washed with the following mixture three times a day:

RECIPE No. 37.

Take powdered alum	2 oz.
Oil of vitriol	2 drs.
Honey	4 oz.
Water	2 qts.

Mix the first, second, and third ingredients together in an earthen vessel, and pour upon them the water. It is to be poured into the mouth when the head is held up, and, immediately releasing the animal as soon as a teacupful has been administered, the motion of the jaws that ensues causes the mixture to reach all parts of the mouth. Green food, roots, nutritious mashes of meal or boiled corn are required as soon as the animal is able to masticate. There are many remedies to be employed in this as in all other diseases, which the veterinary surgeon alone understands, and are not safely intrusted to others except for administration. They are not included here, as, in most instances, it is not possible to obtain them in many districts where this work may reach. The scientific veterinarian throws himself upon the resources of chemistry, and produces solutions of chlorine gas, sulphurous acid gas, &c., &c., which in his hands prove valuable remedies, the manufacture of which is not possible upon many farms and other places, and particularly when required at a short notice. Although we have heard little of the disease during late years, such is not evidence that it has disappeared. In the great rearing districts of Ireland and elsewhere it is occasionally seen, but there are no veterinary surgeons to report it. The most probable cause of gloss-anthrax is direct inoculation with the proceeds of some other form of anthrax disease, or putrid poison taken with the food. That this is rare is owing to the delicacy of the ox tribe generally, these animals scrupulously

avoiding anything having an offensive smell. It therefore happens that gloss-anthrax is observed as a rule where other forms of anthrax and septic poisons generally prevail, and this will account for it during the prevalence of epizoötic aphtha. Its disappearance from any locality must be regarded as safe only in proportion as scrupulous cleanliness is practised, and dead carcases, with blood, and offal, are disposed of by deep burial, complete destruction, disinfection, &c.

5. TEXAN FEVER. The Contagious Fever of Texas.

A notice of this peculiar malady is forced upon us by the increase of importation from America. Hitherto it has concerned only the stockowners of the vast continent, who recruit their herds from the swamps of Texas and Florida; but as the ocean highways have ceased to prove insurmountable to those interested in cattle traffic to this country, it is no longer a question to be allowed to proceed without great watchfulness. Failing this, our home stock may be imperilled as in the days when other virulent and contagious plagues have been imported from Europe and Asia.

Nature.—As far as this is at present understood, Texan fever consists of a form of low or typhoid specific blood poisoning, arising from the septic condition of the soil of the district, which is of a swampy and malarious character. The spleen especially suffers; but other organs, as the liver and kidneys, are involved in a general blood extravasation. The urine also contains blood, and the fatty, as well as other tissues not in this state, are greatly discoloured by the presence of bile elements, which are not separated, in consequence of the loss of function.

The *cause* is doubtless in the septic character of the ailment derived from the soil—vegetation virtually poisoned by the excess of manurial compounds which stamp the character of the soil of the district. It is not unlikely that, besides a direct blood poison being present within the food, there may be also in its composition an excess of non-elaborated or imperfectly

formed albuminoids, or albuminous compounds, which, in the presence of the actual septic principle, quickly enter into a state of decomposition within the system. Indeed, such a poison may have the same, or at least a similar effect in degree, upon all albuminoids within the system; and thus the extremely rapid multiplication of the poison germs may be accounted for, which also forms a key to the nature of anthrax diseases generally, their variation and degree of intensity, &c., in different animals, depending of course upon the peculiarity of soil and district which furnishes the poison, and establishes its specific nature.

Like cattle plague, vesicular aphtha, and other foreign contagious diseases, Texan fever is known as a comparatively mild affection on its native soil, but instantly developes into a mighty giant of slaughter when its septic germs enter the system of animals of other breeds and countries. American authorities assure us that cattle not of the Texan breeds do not convey the disease to each other, the real work of propagation by the so-called contagium being due to the travelling Texan beast, in whose train certain death waits for all those of opposite breeds which may, unfortunately, pass over it. The elements of disease are contained in the excrement of the Texan cattle which serves to contaminate roads, lairs, cow-sheds, pastures, the holds of ships, railway trucks, etc., and after drying and disinetgration, is blown in every direction to the peril of others. The excrement of British cattle suffering from the disease, is not capable of endangering others; therefore, under these circumstances, a farmer travelling his cattle home from market and contracting Texan fever among them, although every member may be suffering acutely, and each one afterwards die, yet if he turns them into his pastures adjoining those in which his neighbour's cattle are grazing, they are perfectly safe. This shows the disease is not communicated by the. breath, or by what is known as infection, yet we may see sufficient in what we have already learned in reference to the subject to be fearful that a few cargoes of Texan cattle gaining access to our shores may set up such a conflagration that may not be easily sub-

dued. That this is not only within the range of possibility, but one of actual probability is now pretty clear, notwithstanding the attempts of Earl Spencer to allay the fears of the multitude. In a recent speech the Earl pointed out what he conceived an impossibility for the disease to enter this country, as *all* the beasts imported from America are slaughtered. The statement only goes to show how innocent the Earl is of the matchless doings of cattle traders, and how weak is the Act which schedules only a few places on the same tract of land. It is within the memory of most of our readers that, in 1865, when Russian cattle were forbidden to leave the ports in the Baltic, the acutely inventive genius of the traders suggested their being conveyed over the frontier, and thence by rail to a convenient port in Holland, from whence they were shipped as Dutch cattle to our shores. It was thus that cattle plague was brought from Estonia, we believe, by way of Altona. In the present day nothing can baffle the Yankee, and turning his attention to the cattle trade, we are told by the "Daily Telegraph,"* that he coolly travels the animals from the States as far as Montreal; they are then shipped to Scotland and North British ports. Coming from a non-scheduled port, they enter as store cattle, and travelling to England are branded as Scotch, and bring "the highest price." There is evidently much in a name, and the Yankees having noticed how conservative we are in this respect, are profiting by it. American beef found no favour with us at sixpence and eightpence per pound: we pronounced it worthless, etc., etc. The shops that were opened, and companies formed for the sale of the cheaper meat soon were closed, and it was only after the butchers changed the tickets—calling it English or Scotch beef, and charging one shilling per pound—that they could sell it. At the present day there are hundreds of families who, if they knew it, would not tolerate a fibre of American meat in their houses, but, in blissful ignorance, are largely patronising the

* The account, which appeared in the issue of October 22nd, 1880, was based on a statement contained in the "New York Tribune."

importation of it every day of their lives by an extensive consumption. They refused to pay the Yankee sixpence, and now he enjoys the pleasure of supplying them, under another name, with the same article at one shilling, doing a roaring trade, and the demand is largely increasing.

Although Texan fever exhibits the dangerous characters we have noticed, thus placing it side by side with some of the most deadly plagues, yet as disease which is capable of being so rapidly propagated, it nevertheless differs widely from them in other respects. Like hog-cholera, it cannot be ranked among contagious diseases, yet it is to be understood as being highly destructive and fatal, against which the most scrupulous and precise regulations should be exercised, as with a foreign epizoötic. The only remedy consists of enforcing the dead meat trade or compulsory slaughter of imported stock, which have been fatted for the purpose, exceptions being extended to rare instances of introducing special animals for breeding purposes, when coming from safe places. The disease is greatly facilitated and propagated in warm or hot weather; but the cold or frosts of winter destroy the contagium or poison germ. Animals of adult age (we are alluding to Texan cattle), may be successively attacked, as they are by no means exempted by a previous disease, whereas British cattle will rarely recover the first attack, the type being malignant and rapid. Native sucking calves are but seldom affected.

Symptoms.—A period of incubation, extending from four to five weeks, is said to characterize the disease at home, the termination of which is known by an unusual elevation of temperature, ranging from 103° F. to 107° F. The usual manifestations which date from this period are somewhat as follow:—Throughout some days—probably about a week—there is weakness and dulness; the sufferer is easily tired, and these signs gradually merge into absolute debility, extreme prostration and stupor. As he stands the back is arched, the hind legs are brought forward beneath the abdomen, and are bent and tottering; the head is held so low that the nose sometimes rests on the ground. The appetite and rumination

are suspended; spasms and twitchings affect the muscles of the body, especially those of the neck and flanks; the horns, ears, and surface of the body are hot, and a cough often greatly annoys the animal. The strength rapidly declines, and the creature seeks a place of rest; if water is near he will lie down in it, and even drown. The mucous membranes, at first of a deep yellow or brown colour, change to a red or purple, and the scanty and hardened fæces are covered with a thick mucus, and sometimes blood clots. The eyes are fixed, glassy, and the pupils dilated; coma sets in, and the animal dies without recovering consciousness. In some cases, however, the disease terminates in convulsions without complete insensibility.

Treatment, for obvious reasons, is not recommended. For the safety of all other animals susceptible of the poison, those suffering should be slaughtered, and their remains carefully destroyed by prolonged boiling, and deep burial afterwards, or the process of cremation may be more or less closely imitated with great efficacy in destroying the poison. The litter and excrement should also be collected and burnt, and strong caustic solutions employed for cleansing woodwork. For the stable floors and roads, solutions of green vitriol, carbolic acid, dilute sulphuric acid, &c., will be useful as pointed out under preventive measures at the end of this section.

ANTHRAX FEVER IN THE PIG.

Two forms are common in Britain:

1. HOG CHOLERA.
2. APOPLEXY.

1. HOG CHOLERA: *Typhus, Anthrax, Gastro-enteritis, Erysipelas carbunculosum, Cyanosis; Swine Fever*, FLEMING; *Pig Typhoid;* in the vernacular, *Distemper in Pigs, Red Soldier, Blue Sickness, Blue Disease, Measles, &c.*

Nature.—This is much questioned. Some regard it as typhus,

others as anthrax ; hence the various appellations. It is without doubt a malignant blood disease, and may be viewed as an anthrax form of fever, modified by habit and constitution of the animal ; yet there are conditions that appear to negative this. The blood contains a microscopical organism similar to that found in analogous diseases, of the order bacteriæ, in this instance known as *bacillus suis*. Healthy pigs, sheep, rabbits, &c., inoculated with blood thus diseased, become affected with the malady under notice. Pigs, doubtless, are mostly affected through admixture with the food.

Symptoms.—Premonitory signs are late, or very transient, and seldom observed. Dulness, drooping head and ears, and loss of appetite may be observed in some cases during the *first stage.* These are seldom seen, as the animal isolates himself from the rest, and is buried beneath the straw, a heap of faggots, &c., and thus seeking quietness, often remains until he dies.

FIG. 46.

Second stage.—Abdominal pains are indicated by lying with forefeet outstretched, and the abdomen pressed on the ground, and general uneasiness; when caused to move the sufferer shrieks. Sometimes the pigs run about as if wild, screaming or grunting in a very painful manner, at others they are dull and stupid. The skin assumes a purple colour (see plate), particularly over the abdomen, inside of the thighs, and upon the back and ears. If pressed, the colour disappears, except when blood material has already been effused, as occurs at a later period. Visible membranes partake of the discoloration, and sometimes an appearance of cutaneous eruption ensues.

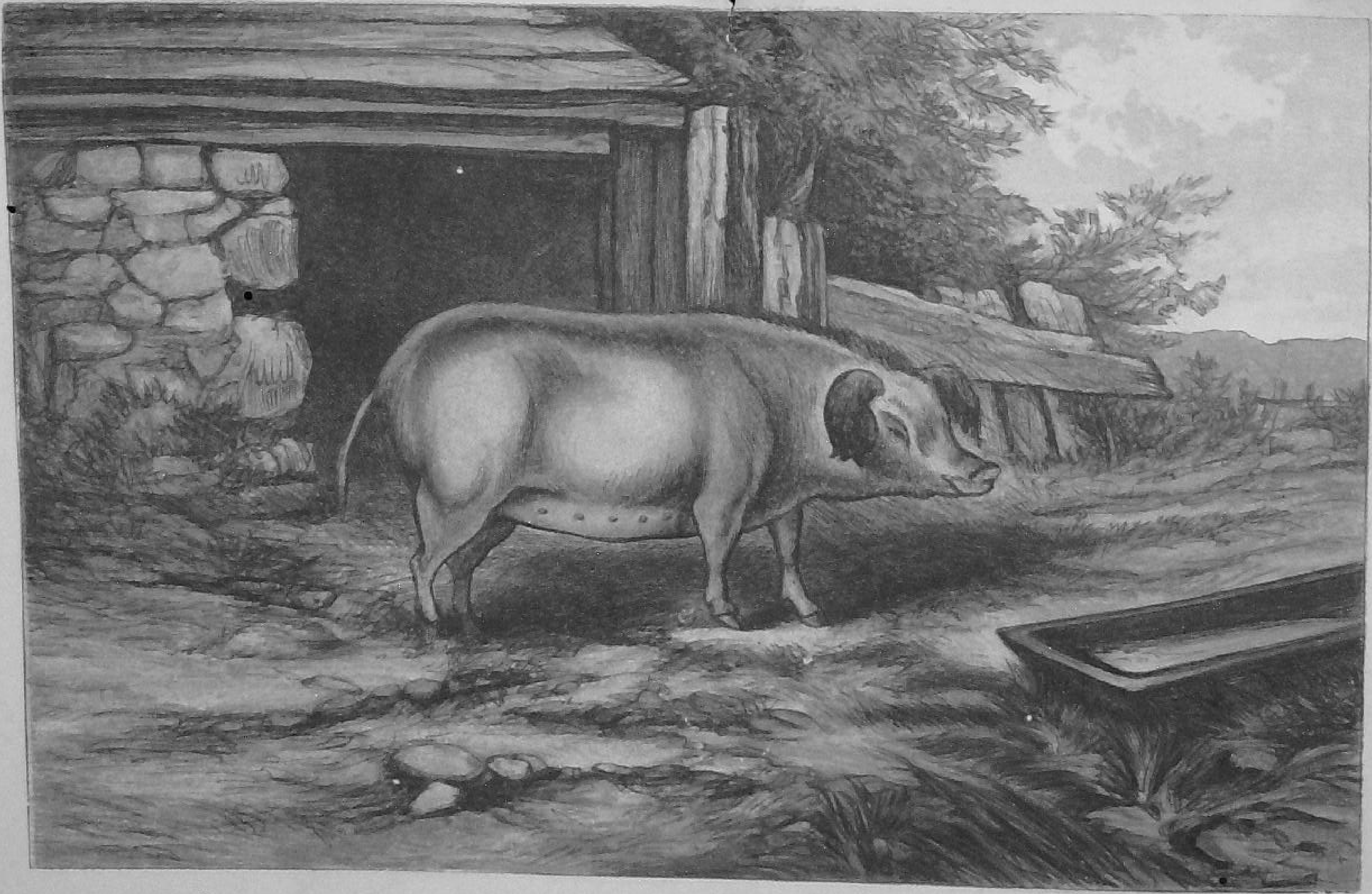


PLATE II.—*Hog Cholera.*

The pulse is rapid, but small and feeble, and sometimes violent sickness comes on.

Third stage.—Diarrhœa, which may have set in during the second stage, is now profuse, and the dejections are black and offensive. The pulse is sinking, becoming more rapid, smaller, and weaker, and at length is imperceptible; the breathing is spasmodic or catching, owing to the congestion of the lungs, and a painful irritating cough is present, which increases the general weakness; the animal can scarcely stand, the legs cross or plait with each other, and complete paralysis soon follows. Sloughing and ulceration now succeed the eruption on the skin, the animal becomes insensible, and dies in from three to six hours. Slight forms now and then appear, which consist of discoloration of the skin, and loss of appetite, extending over a day or two, and recovery follows; but these are not common. In other forms of the disease the intensity of action appears to be located in the bowels, the dejections being black, fœtid, profuse, and mingled with much blood. Prostration is present from the outset of the disease, the skin is not so deeply tinged, sometimes only slightly, and death is very rapid.

Post mortem Appearances.—These consist of a purple or black discoloration of the skin, and petechial spots on the mucous membranes externally.

Internally the lungs are congested, the cavities of the heart and bloodvessels contain black fluid blood, and the surfaces of the investing membranes are studded with spots or patches of extravasation. Other portions are also discoloured by blood-stains only. The greatest evidences are present in the intestines, particularly in the vicinity of Peyer's glands, where various stages of congestion are to be observed, together with increased growth of the gland cells, and ultimate softening, elimination, and ulceration, &c. In rapid and virulent forms the mucous membrane of the whole alimentary track is more or less affected, that of the stomach, being coal black, thickened, and elevated by subcellular infiltration; blood material has also largely exuded from the surface. The peritoneum, bladder, &c., are covered with blood patches; the liver and spleen are congested,

while other parts are reddened by the usual blood-stains. The brain is also heavil" congested, and the cavities contain an excess of fluid.

Treatment.—The general principles are the same as laid down for the treatment of the forms of anthrax already described. Stimulants are required to overcome the tendency to sinking, which is so great in these diseases; and during constipation oleaginous purgatives, which may be combined with the stimulant for the sake of convenience. The action of the bowels may be promoted by the use of clysters if necessary, and considerable advantage will be gained by sponging carefully the body with cold or tepid water, followed by friction with a piece of flannel until the surface is dry. In some instances this cannot be borne, therefore human feeling will suggest the impropriety of torturing the sufferer. Clean soft beds with airy places are required for all diseased animals, and they should be isolated from others. Perfect cleanliness must be enforced, the removal of excrement being prompt, and disinfectants freely used over the floor, &c., otherwise no hope of mitigating this disease can be entertained.

Those of the animals least affected, and able to go out in quest of food, may be allowed to wander in the lanes or over a bare pasture; the fresh air and exercise will contribute towards the establishment of healthy functions. The propriety of drenching these will depend upon circumstances. If, however, there are any signs of intestinal disturbance—as bloody fæces, diarrhœa, &c.—animals so affected must not be allowed to go abroad.

Is the Disease Contagious?—The frequent appearance during the past ten or fifteen years, as well as its constant introduction from abroad, especially from America, naturally awakens a lively curiosity in reference to the infectious or contagious nature of this form of charbonous fever in the pig; and from the amount of interest at stake, it is well that some definite understanding be arrived at. It has generally been noticed that animals are rarely affected singly,—in each outbreak the malady spreads with rapidity to others in cohabitation; and,

further, when healthy animals are introduced to the company of those diseased, and *vice versâ*, a similar extension of disease is observed. Cargoes of pigs, supposed to be healthy when embarked, apparently contract the disease during the voyage, and when the vessels reach our shores numbers are dying, others have to be killed, and many have been already thrown overboard. The common occurrence of this form of charbonous fever, whether in England, America, or during transit, engenders a strong assumption in favour of its infectious or contagious nature, and withholding for the present our conclusions in reference to the matter, we pass on to notice the various peculiarities which must be taken into account. Professor Axe considers that a period of incubation exists equal to thirteen or fourteen days; we, however, hesitate to go so far as this, for, considering the peculiar habits of the animal which lead him to wallow in all manner of filth, the test which can determine the point must be very delicate. We have elsewhere expressed a partial concurrence with the theory of infection, but with the lapse of years we think further observation is required in order to confirm or even establish this as a special characteristic.

The increased prevalence of the disease may be traced to one or more of the following causes:—

1st. Like gloss-anthrax in cattle, hog-cholera has also followed epizoötic aphtha, pleuro-pneumonia, and rinderpest, the *materies morbi* of one blood poison giving rise to another in a different animal. This occurred as the different creatures innocently commingled on the pastures, &c., and the fact is not without its significance in our study of the nature of several of the diseases of different animals, assisting as it does, very materially, in their grouping or classification. Since 1865, many thousands of cattle have been slaughtered, and the carcases in numerous instances were very imperfectly buried, while in others the place of interment was ill chosen, and the results were, that with such enormous masses of putrefying flesh, the surrounding soil was saturated with the gases and other products therefrom, and succeeding rainfalls carried them

to the various drains, and thence to the ponds, springs, and wells, &c., from which healthy animals drank. The materials undergoing putrefaction have also been washed direct by communicating drains to the ponds, and the grass growing over the graves of imperfectly covered bodies, communicated the poison to horses and cattle grazing upon it.

2nd. The natural habit of the pig to wallow in all manner of filth at once renders him a more likely subject of hog-cholera, as the elements of the very worst form of putrefaction in the shape of blood and offal of other animals dying or slaughtered when suffering from various blood-poisons, are most likely to be hunted up by them.

3rd. The blood and offal of such diseased animals is often thrown direct to the pig, or otherwise into the stock of food, and there it undergoes decomposition.

4th. Sewage gas conveyed direct to the sties by means of drains opening into the sleeping apartments, having imperfect traps or none at all.

5th. Food or water with which sewage has become mixed.

With these numerous sources of the disease we need not be surprised at its sudden and malignant appearance from time to time, and they furnish the important fact that the numbers attacked are under the operation of a widespread cause—the first, but which is not the poison generated by the prevalence of hog-cholera. It is the *materies morbi* of some other blood-poison existing in, and discharged from, a totally different species of animal, or the malignant poison of putrefaction which some portion of the dead body of such an affected animal is undergoing, and it is just possible that blood and offal of healthy animals, but undergoing putrefaction under certain circumstances may be a fruitful cause.

We now consider its appearance in a number of animals which, as far as is known, have not been subjected to the foregoing causes. We do not yet believe in the existence of a volatile virus by which hog-cholera is communicated; therefore we cannot think it is conveyed by the breath or exhalations from the skin, &c., of diseased animals. So far, then, we

cannot say it is either contagious or infectious; but knowing that the products of the fully developed complaint quickly enter into a state of putrefaction, or they have already commenced the process within the body, very small portions of these only are required, especially in a dry state, when they are readily carried hither and thither, to develop the disease in sound animals. The means of conveyance may take place in one or more of the following ways:—The products of disease or putrefaction being in a concentrated condition, dry and light, may be conveyed by the hands, clothes, boots, &c., of those having the charge of affected animals; deposited upon litter it may be carried a considerable distance, and is given to healthy pigs; and, lastly, healthy pigs may obtain access to the excrement of those diseased, or to drains running from sties in which such are confined. It is, we think, just possible that the appearance of hog-cholera in a cargo of pigs sailing between America and England is due to one of these causes, and its extension among subsequent victims to their wallowing among the accumulating excrement and fluids of the first affected. The warmth and ill-ventilation of the holds of many vessels, we also think, operates very powerfully upon the fæces and urine of pigs as they are crowded together, and it is not impossible that, as these accumulate they also enter into rapid putrefaction, the air is fouled and the animals breath it to their great detriment. Food is thrown to them indiscriminately which is contaminated with the elements of putrefaction, and this, acting on a system more or less devitalized by the foul air, speedily communicates to the blood poison which ends only with life.

In all cases we have apparently the elements of contagion, and with the presumed period of incubation the whole seems complete; but may we not rather look upon the affair as one of direct inoculation? the application of putrefactive agencies to an absorbing surface, the result a blood-poison, being characterised in the pig by specific signs as the blood-poisons in other animals arising from similar primary causes, the prevalence of the disease being regulated by the form and condi-

tion of the *materies morbi;* that is, depending upon its state of freshness, a highly malignant attack would be the result, while in the dried state the action is delayed and a milder form ensues.

It may, therefore, be justifiable and even imperative under certain conditions to assent to the presumed infectious or contagious character of hog-cholera; but in adhering to the manifestations which scientific men acknowledge as stamping the character of contagious diseases, we are led to the conclusion that, in the true sense, hog-cholera has not yet been definitely proved to belong to that class. It is without doubt a highly destructive malady, and once having appeared the most determined efforts are required for its extermination. It is wise, therefore, that this swine-plague is now dealt with under the provisions of the Contagious Diseases (Animals) Act.*

In reference to this disease, as reported by American pathologists, the *Farmer* of November 17th, 1879, makes the following observations:—

"DISEASES OF SWINE.—We have just received the 12th special report of the American Department of Agriculture, which contains the reports of the specialists appointed to investigate the so-called hog-cholera. The careful microscopic investigations of the veterinarians showed that the disease is probably disseminated by means of a new order of *bacteria*, or *bacillus*, which Dr. Detmers names *bacillus suis.* These were invariably found in all parts of diseased swine, and when introduced into healthy animals, either directly into the blood, or through the stomach or lungs, they produced the 'cholera' in swine, rabbits, and rats. This fact would account for many otherwise unexplainable outbreaks where it was supposed that there could have been no exposure to contagion. These veterinarians came to the conclusion that 'stamping out' is the only safe remedy, especially as although many animals may and do recover, this recovery is not perfect: 'In most cases lasting disorder remains behind, and more or less interferes with the growth and fattening of the animal. Those that do recover make very poor returns for the food consumed; hence, from a pecuniary standpoint, it makes little difference to the owners whether the animal recovers or not. Another suggestive thought

* See the Author's Prize Essay on "Anthrax, Septic or Carbuncular Fevers amongst Horses, Cattle, Sheep, and Pigs," published in "The Highland and Agricultural Society's Transactions," Vol. VIII, 1876.

in this connection is whether, in case a hog recovers and is fattened, these *bacilli* may not be communicated to the consumer of such hog products. The volume is evidently the result of very careful and skilled investigations, and throws great light on this hitherto obscure disease.'"

That *bacteriæ*, or the *bacillus suis*, introduced to healthy animals may convey a blood poison is not to be doubted; but fortunately we do not, as a rule, have the flesh of pigs thus affected sent to our tables. We need not fear on that score. If we mean to put an end to the swine plague the pigs should not be allowed access to decomposing offal and filth. As they cannot be taught to desist from "wallowing in the mire" when it is within their reach, it would be well to remove them from it, and when allowed to follow the instincts of their nature by digging with the nose, the alternative of a piece of arable or other clean land should be offered. Few non-professional persons have noticed that this, as well as malignant anthrax diseases in other animals, have appeared almost constantly both in England and America, and we believe the putrefying carcases of the thousands of cattle, victims of various plagues, and often the subjects of very imperfect burial, have, in the majority of instances, been the chief cause.

2. Apoplexy in Pigs.

There are several forms described, but in all, doubtless, the causes, viz., plethora and confinement, &c., predominate in their production, although the specific blood poison of anthrax may not be developed. The prevailing diseases of pigs, to which the term apoplexy is applied, however, partake more of the true characters of anthrax than otherwise, particularly in young growing animals. *Symptoms* are few at the outset. Restlessness, bloodshot eyes, and variable appetite, with constipation and scanty excretions of dung and urine. As the animal eats he suddenly stops, reels, and falls down dead, a great quantity of foam issuing from the mouth.

Post mortem Appearances.—Fluidity of blood in the vessels; it is also dark in colour; purple or black patches (ecchymosis), with larger portions of extravasated blood, are seen between tissues and beneath investing membranes, and more or less serum is present in the various cavities. The lungs are congested, and heart full of partly coagulated blood. The brain is congested, arachnoid membrane covered by spots of ecchymosis, and the ventricles contain an excess of fluid.

The fact that pigs affected with this or the preceding disease have been slaughtered and used as human food, has gone far to support the opinion that no anthrax poison is formed, or, in other words, that neither partake of the character of anthrax or carbuncular fever, although the general *post mortem* appearances so closely follow the type of those taken as an example. We must not, however, forget that the apparently healthy and clean parts of young cattle rapidly dying, or slaughtered early when suffering from black quarter and braxy, are not unfrequently made use of as human food. Malignant pustule is not inevitable after such a practice, nor yet putrid fever or death, to prove the unsoundness of such flesh; but the great supply of meat in our metropolitan and provincial markets is not without its effects upon a population using it, who are, generally speaking, slow to observation upon such matters. If the previous history of much of the flesh food which finds its way to the poor man's table could be learned, we might have less difficulty in attaching importance to many signs now productive of no uneasiness. Happily, cooking, salting, and even exposure to the air, destroys the poison of these diseases, but the processes are not always properly performed, and from that cause the East End poor of London, who buy most of this kind of meat, may be said to suffer from eruptive complaints. If they do not suffer from the poison of anthrax they at least obtain badly nourished food.

Treatment.—Apoplexy among pigs is a most fatal complaint, and with its first appearance in one animal preventive measures should be instituted for the safety of the rest. They should be placed at once upon low diet, have regular exercise,

the strictest cleanliness being observed, and a dose of medicine, such as the following, exhibited without delay:

RECIPE No. 38.

Take of Epsom salts	2 to 4 oz.
Calomel	3 to 10 grs.
Ginger	2 or 3 drs.
Treacle and linseed mucilage, sufficient.	

If constipation is great, clysters should be used in addition. If there is time allowed by the mildness of the symptoms—which, however, rarely happens—the above dose should be given to the affected animal. With the first death, a careful *post mortem* examination should be made by a veterinary surgeon, who will be best enabled to point out all proper details.

II.—ANTHRACOID DISEASES.

1. PARTURIENT APOPLEXY: *Parturition Fever*, *Vitulary Fever*, &c.; *Fièvre vitulaire* of the French; *Kalbefieber* or *Calving Fever* of the Germans; *Parturient Collapse; Eclampsia Puerperalis;* and *Puerperal Typhus.*

This affection is frequently confounded in detail with two other diseases, viz., *Metro-peritonitis* and *Adynamia nervosa generalis* (which see Sections VI. and VII.), all of which are often viewed and described as one disease, under the name of "milk fever" or "the drop," &c.

The subjects of this malady are cows of all breeds that are heavy milkers and liable to plethora. It usually occurs at the third and later periods of parturition—*seldom before, and never follows difficult or protracted delivery, uterine hæmorrhage, flooding, abortion, or retention of the uterine membranes* (placenta).

Nature.—A blood disease, sudden in its attack, characterized by a rapid tendency to congestion of the brain, coma, and apoplexy; occurring in connection with parturition, and possessing a great liability to recur with increased severity at each

succeeding delivery.* Few cases, however, recover even from the first attack.

Symptoms.—Premonitory signs, which are seldom observed, may be looked for immediately after calving. These are disinclination to move, staring appearance about the eyes, checked secretion of milk, accelerated pulse and respiration, with increased heat of mouth, extremities, and system generally.

The *second stage*, which usually comprises the first noticeable symptoms, is, in the majority of instances, entered upon during the first twenty-four hours after calving. The cow shakes her head, totters and staggers in walking as if the hind legs or loins were weak, and shortly drops to the ground unable to rise. The eyes are bloodshot, fixed, and glassy, and almost insensible to the touch—she is nearly blind—the pupils are dilated, and the eyelids twitch violently; the pulse is full but soft, with a frequency considerably below that found in the first stages. Animal heat is not above 102° or 103° F.

The *third stage* rapidly succeeds. The mucous membranes assume a dark purple hue, and the animal is totally blind. The head is probably turned backwards on the shoulder, or is dashed from side to side, in great danger of breaking the horns or of hurting those in attendance. The pulse is slow, tardy, and infrequent, scarcely numbering more than twenty-five or thirty beats, then gradually becomes rapid, feeble, smaller, and at the end imperceptible. The breathing is slow, roaring (stertorous) and even difficult, and the pupils are now contracted. Animal heat rapidly declines, reaching as low as 95° F., and the horns, ears, and extremities are cold as clay. The udder is no longer soft and flaccid, but hard, turgid, and unyielding. If fluids are poured down the mouth they pass into the windpipe, as all power to guard the entrance to that tube is lost. Digestion is suspended, as indicated by swelling of the left side, from gaseous disengagement within the rumen

* Continental veterinarians, with Francke at the head, regard the disease as anæmia of the brain, arising from the hyperæmia or fulness of blood in other organs, as the intestines, &c., after parturition.

or paunch, which greatly interferes with respiration, particularly if the cow is lying upon the left side. The discharge of fæces is not always arrested from the first, but constipation and

FIG. 47.—*The Comatose State*

stoppage of urine now very evident. Convulsions in some instances recur from time to time, but death ensues frequently without a struggle within forty-eight hours from the commencement of the attack.

Favourable signs consist of slight or returning consciousness copious but normal discharges of fæces, increase in volume and strength of pulse, gradual rise in animal temperature,* return of milk, and desire to sit erect, partake of food, ruminate, &c. The recovery takes place so rapidly, as a rule, that it is difficult to realize that the animal now standing and caressing her calf can possibly be the one which, less than twenty-four hours before, was lying prostrate and insensible. It is always considered favourable to recovery when the attack is delayed after parturition; conversely, therefore, when the cow is seized immediately after, or before, calving, as some are, recovery is not at all probable.

Post mortem Appearances.—The whole body has the appear-

* Observations with the thermometer should be made hourly in these cases, as by it information can be gleaned prior to other symptoms appearing.

ance of being well fed; blood-vessels charged with black fluid blood; ecchymosed spots are visible upon the heart, and often upon the lungs, stomach, and intestines, &c., &c. Sometimes the womb is also similarly affected, but not as a rule. Blood is extravasated over the brain, *medulla oblongata* and cervical portion of the spinal cord. In the substance of the brain, the characteristic *puncta vasculosæ* of the *centrum ovale*—upon which pathologists place so much value as a sign—are present, besides excess of fluid in the lateral ventricles. In some instances the nervous system exhibits only these last-named lesions. The windpipe is often choked with injesta, which has been forced by abdominal pressure into the mouth, and drawn into the tube during inspirations.

Treatment.—Preventive measures are attended with success if properly instituted; but a difficulty frequently exists with proprietors in their not being capable of forming suitable conclusions from an observation of signs equally with the medical attendant of his stock. Cattle that are predisposed to parturient apoplexy, should receive, before calving, low diet of a laxative nature, with the occasional use of a few Epsom salts, and the udder drawn regularly as soon as the milk appears. Attention also should be paid in order to secure good housing, ventilation, and sanitary regulations.

Medical treatment consists of a copious bloodletting when the pulse is *full.* If insensibility, blindness, and decline of the pulse and temperature have taken place, bleeding will then hasten death. Next, and which would constitute the first step in treatment if bleeding cannot be accomplished, a powerful cathartic must be given: The following is suitable for large dairy cows, three-fourths may be given to an Ayrshire cow, or animals of the size:

RECIPE No. 39.

Take of Epsom salts	16 to 24 oz.
Calomel	1 ,, 2 drs.
Croton oil	15 ,, 30 drops.
Ginger powder	2 oz.
Treacle	1 to 2 lb.
Linseed mucilage	2 qts.

Mix, and administer with great caution, and during insensibility should be passed into the stomach by means of the tube

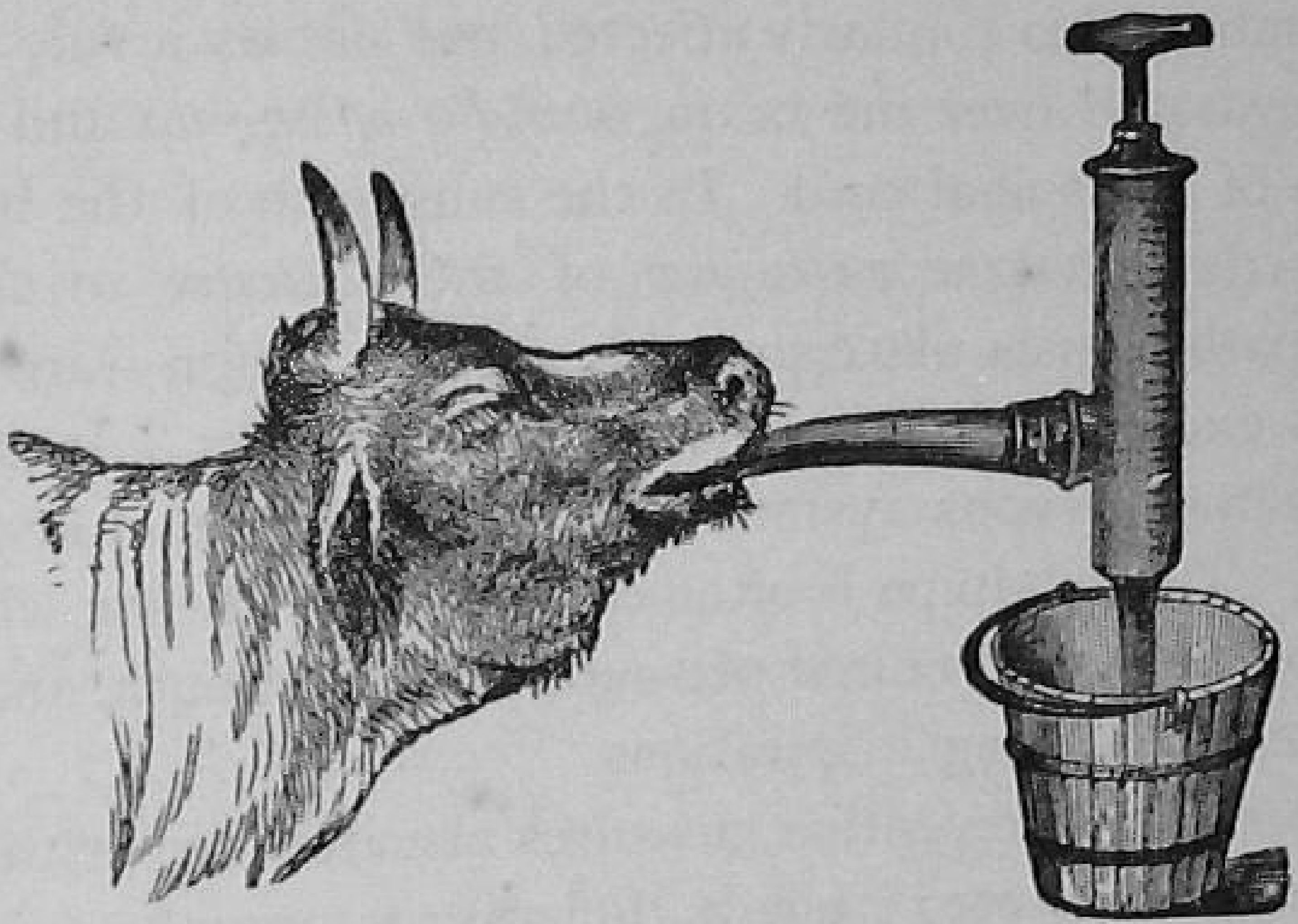


FIG. 48.

of the stomach pump (Fig. 48). The catheter (Fig. 49) should be passed, and urine withdrawn. (See Fig. 139.) If any *tympanitis* (hove) results after the medicine has been given, the probang may be passed down the gullet to allow the gas to escape. Some practitioners administer the following:

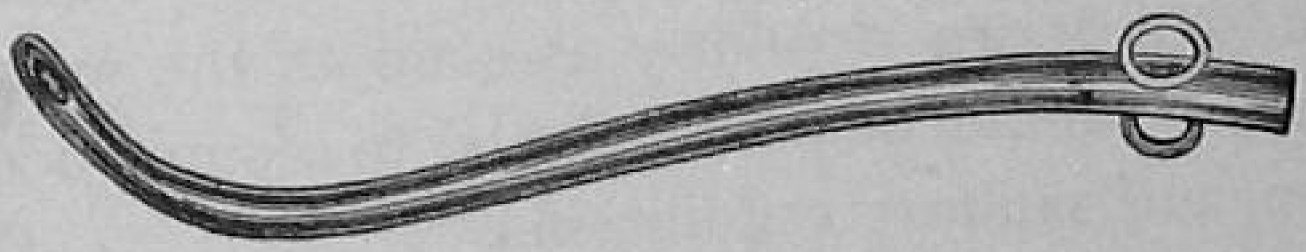


FIG. 49.

RECIPE NO. 40.

Take of aromatic spirits of ammonia ...	4 oz.
Ground gentian and ginger ...	2 ,,
Linseed mucilage ...	1 pint.

Of the preparations of ammonia, the liquor, or watery solution, and sesqui-carbonate are also invaluable; but great caution must be exercised in their use, as from their powerful caustic nature, unless largely diluted, they are apt to produce

extensive soreness and sloughing of the membranes of the mouth, tongue, and fauces.

Enemas must be used every ten or fifteen minutes, and ice or cold water should be constantly applied to the head. Dry friction to the body, extremities and udder is of immense service. The milk should be drawn, frequently, and warmth of surface promoted by rugs or a covering of straw when friction is not being employed. An erect posture should also be preserved as much as possible by means of trusses of straw or bags filled with it, and tightly pressed beneath the shoulder and flank. The head should also be kept up by similar means, or ropes attached to a halter ; the other ends being fastened to the walls or a beam above.

As soon as these details have been carried out, which will occupy some considerable time, the next step will be to organize a system of nursing for the sick animal, and at the expiration of two hours, half the ammonia draught (Recipe No. 40) must be given and continued *every two hours*, until the medical attendant deems it necessary to make an alteration or change in the remedies, which he may require to do in accordance with symptoms. As a rule, however, the details already given will be sufficient

Considerable benefit will result from a free use of the "Antiseptic Fluid" to the whole of the vagina, as well as being injected within the womb. See "Heaving Pains in Ewes."

If the signs of unconsciousness are persistent, further treatment becomes a complicated matter to the non-professional person. Solutions of strychnine or tincture of nux vomica are used endermically, *i.e.*, by injection beneath the skin. (See Fig. 37, page 100.) In this way sometimes the nervous system may be roused when absorption from the intestinal canal is entirely suspended. This failing, a second injection may be used ; but it is not advisable to use large quantities, or at too frequent intervals. Galvanism may also prove serviceable, if the current is passed along the course of the phrenic nerve in order to promote respiration. When success does not attend these

measures, remedies are injected directly into the circulation. This is effected by opening the jugular vein, and after the insertion of a proper instrument or syringe, as seen in the engravings 25, 38, and 39, pp. 76 and 100, the medicine is passed downwards in the course of the circulation. These are, however, measures that can only be safely intrusted to the qualified practitioner and scientific pathologist; and although they at the present time constitute a kind of experimental treatment, there is encouragement to be gathered, and it is not unlikely that their effects may be considerably strengthened, and ultimately become powerful means of good.

Cows that have recovered from parturient apoplexy should not be allowed again to have calves: it is better to feed them for the butcher than run the risk of attacks that are certain to end in death at a future time. When it is desirable to retain and breed from a valuable animal, proper means for prevention should be instituted, which are usually of the character already given; but the advice of a veterinary surgeon in each case is necessary, as special conditions and peculiarities occur that cannot be discussed in general rules.

The question of using the flesh of cows suffering from parturient apoplexy is one which the veterinarian is called upon to decide. This must always be in the negative when much medicine has been given. Although it is grouped among anthracoid diseases, yet there is no positive evidence that specific blood poison germs have been discovered, nor has it come to the knowledge of the Author that persons consuming such flesh have been poisoned. As we have already stated, it is well that cooking has an important and salutary effect upon the flesh of animals generally, or much mischief, we fear, would arise. The carcase of one animal now and then sent to market is not of much consequence, but it so happens that where the greatest demand is for meat, the greatest supply is most likely to be sent, and among the general consignments the flesh of animals slaughtered while suffering from blood diseases form a considerable portion. The appearance may be faultless, but common sense indicates that in point of quality such

flesh cannot be as good as that of animals killed in perfect health. It always goes through particular channels, realizing only an inferior price, and is sold to the poorest, who are abundantly supplied with the same quality weekly. Such flesh as food, coupled with the improvident and intemperate habits of the class, are ample causes for the carbuncle, boils, and eruptive complaints so commonly seen among them. It has long been evident that, to complete the necessary conditions which would reduce to a minimum the losses of the breeder from all diseases, there is required such an organization as would render the offering of the carcase of any animal suffering from any disease as altogether unprofitable. A simple system of insurance, with local action on the part of the farmer, and a little more liberty on the part of landlords, might be made effective for all the purposes, and for the general good.

Pre-parturient Apoplexy in the Ewe.

Nature and Prevalence.—This form of apoplexy, which partakes of the nature of a blood disease, prevails among sheep of the improved breeds, or those which, by reason of natural conformation, are liable to contract sudden plethora. It has been observed somewhat extensively at times among the Leicesters and Down Leicesters, as a result of a kind of forcing system, prior to parturition.

Pastured on a rich and elevated soil during the day, and folded on hay at night, with probably an allowance of cake, &c., in order to prepare the ewe for the coming trial, the animal is subjected to the most fruitful causes of a severe, rapid, and fatal disease. Such a mode of management ensures superabundance of food during day and night; it enables the ewe to fill up the stomach in an exceedingly short time, and afterwards to enjoy a very long period in rest and rumination, and to the exclusion of needful exertion. The whole distance traversed during the day is not many yards, and in returning

to the fold at night the same process is repeated, an allowance of even richer food being the only variation. Thus the ewe thrives rapidly. The aliment throws a supply of highly nitrogenised materials into the blood, which more than satisfy the wants of the body, and the animal becomes lazy and indifferent to the least movement. In the absence of exercise the organs of depuration fail to remove the natural products of change and decay, and these being retained in the circulation, added to which is the constant and excessive supply of pabulum from the rich food, the system is, as it were, surcharged, and in a condition capable of contracting disease.

There are two important states now to be considered. By reason of the excess of rich material, or pabulum, in the blood, and the deficient or non-sufficient removal of effete or waste tissues from the circulation, the character of the blood is considerably depreciated, and the first effect is that of failure in the supply of nerve force necessary to functional activity. The assimilative and depurating organs are considerably less active, and this now tells upon the whole system in a more powerful manner. The new blood material is not so elaborated as is essential; it is therefore liable to degenerate, especially as it is in contact with elements already on their way to decay. The fluid is unfitted for circulation, it favours congestion or local stagnation in particular organs, as well as the whole venous system, and with such influences working additional changes, the blood at length becomes a poison in itself. It is thus that the best animals, or those having the greatest disposition to lay on flesh, possess within themselves the essentials to contract a special form of disease, and exhibit the signs in all their intensity. In this instance the part to suffer from the unequal or morbid influences is the brain, through the deranged nervous system.

Symptoms.—The affected ewe is at first disposed to stray from the rest of the flock and seek a quiet place, where she rests without ruminating. There is dulness, probably partial stupor, and occasional grinding of the teeth. If roused, she walks lazily to another place without stretching, and drops

down, assuming the same appearance as before. At a later stage, if suddenly disturbed, she jumps vigorously, but from an absence of controlling power, frequently falls, or rolls heels over head in a very awkward manner. Shortly afterwards she may rise to the feet, but more frequently she only partially rises or sits up, looking round in a dull and sleepy manner. There is now greater stiffness in movement and indications of weakness in the loins and limbs generally, with a want of power to control their action; from this the legs cross each other, or double beneath the weight of the body, and finally they give way altogether, the animal falling to the ground and is unable to rise. Stupor, and at length insensibility rapidly succeed, the breathing is deep and stertorous, frothy mucus escapes from the nostrils, and the sufferer speedily dies. In some instances the ewe, without previous signs of disturbance, simply tosses up the head, and falls insensible; and occasionally consciousness may return, succeeded by convulsions and death.

The more common cases extend to four or five days, during which the respiration is not much affected, except during fright and the movements consequent thereon. The pulse is somewhat smaller, and increased only by excitement; but at length it becomes small or thready, on account of obstruction to the circulation. Animal temperature is rarely increased at first, and the legs and ears continue warm during the existence of the milder symptoms.

Post mortem Appearances.—The liver is often pale and non-secreting, and in other cases congested. The lungs are congested, and the blood is fluid throughout the body. Brain congested, an accumulation of blood being found at some part of the under surface. The general appearances of the body indicate a rapid laying on of fat and flesh and general plethora, with local congestions.

Treatment.—Bloodletting in the early stages is beneficial, but it must not be practised after stupor has set in. The bowels should be moved by a brisk cathartic, and aq. ammonia fort. applied to the sides of the neck or loins as a derivative. Preparations containing belladonna and the neutral salts may

follow, and, when the cerebral congestion is removed, tonics which should include strychnia.

Prevention.—Transfer the apparently healthy ewes to a less prolific pasture at some distance from the fold, if possible, and when they are brought back at night place before them a less nutritious diet, or reduce the quantity of the grain, cake, &c., one half. This should be given in the form of trough food, in which properly regulated doses of neutral salts may be given under the supervision of a veterinary surgeon.

2. After or Heaving-pains in Ewes: *Parturition Fever, Gangrenous Inflammation, Straining after Lambing.*

Nature and Causes.—Blood disease arising in consequence of an unnatural plethora existing at the time of parturition. Excess of artificial food, salt as a condiment, turnips, &c., and confinement in small spaces on rich pastures are fruitful causes. The disease is more commonly seen among the flocks in the south of England, but is known wherever the ewes are disposed to thrive rapidly, and when they bring forth large lambs or twins, &c. In addition to these, there is liability for the disease to spread rapidly in a flock from blood poison, which is communicated by inoculation, principally by the hands of the shepherd as he assists ewes in succession during difficult lambing. But as some animals which have not been assisted in labour become affected, it is not improbable that the process of inoculation ensues from the conveyance of discharges from the external genital organs of those diseased to others cohabiting with them, or retention within the womb or vaginal passages of the morbid secretions due to the blood affection and subsequent reabsorption, may have something to do with the production of the disease.

Symptoms.—These occur about the second or third day after lambing, when the ewe separates herself from the rest of the flock, and stands with drooping head, haggard expression of

countenance, and frothy mucus escaping from the mouth. There is also fulness of flank, staring look, constipation, deficient urine, having a high colour and strong ammoniacal odour; panting, straining, increasing irritative fever; swelling and redness, or lividity, of the external organs of generation, which are hot, and afterwards assume, successively, a deep red, purple, and, finally, black colour.

FIG. 50.—*Ewes with Heaving-pains.*

Straining becomes more intense as the disease advances, and continues until the animal sinks from exhaustion, and dies.

Post mortem Appearances.—Uterus, or womb, exhibits considerable ecchymosis, is inflamed in places, and even gangrenous. The lungs are also frequently much congested, and their external surface, with that of the heart also, is ecchymosed. The right ventricle is full of dark and partly coagulated blood. In protracted cases the veins of the uterus contain pus, and death results from its absorption into the system (*pyæmia*).

Treatment.—Preventive measures are likely to be of more service for this disease than actual medical treatment. The necessity for close attention to the condition of breeding ewes for some time before, as well as at the time of parturition, cannot be too much insisted upon. Heavy mortality often arises from the indulgence in excesses of various kinds, thus: —rich artificial food is too liberally allowed; the turnips may be unusually good, as produced by heavy manuring; and perhaps salted hay, or salt as a condiment, is supplied, and during the time the ewes are confined to a small fold or pasture, taking no exercise. While all breeding animals should be in healthy vigour at parturition, a plethoric state should be

rigorously avoided, and at this time common salt is a positive poison. Food in moderation should be allowed, but the ewes should be compelled to walk about in search for it. Highly plethoric animals should be reduced before lambing, the quantity of rich food lessened, and coarser kinds substituted, while an enforced amount of exercise daily is taken.

In the local treatment of this affection much faith has been placed in the use of carbolised oil, that is, carbolic acid mixed with Gallipoli oil; but from time to time we are reminded of losses taking place which are attributed to certain faults possessed by the remedy. These are respectively an imperfect solution; an improper mixture, or an inferior quality of one or both ingredients, from which a quantity of the free acid is brought into contact with diseased surfaces, occasioning intense irritation and poisoning. Doubtless the original disease is the fruitful source of death; nevertheless, a proper mixture of the remedy should be obtained, but, as long as Gallipoli oil and the acid only are used, such cannot be. Of this the author is quite satisfied, and his numerous experiments and trials, extending over many years, have fully proved that the acid should be first dissolved by pouring over it an equal quantity of pure glycerine, one part of which may be mixed with seven or eight of *pure olive or linseed oil*. This should be made in bulk, and as an antiseptic mixture will be found an efficient preparation, which will be not only free from the objections referred to, but may be put to a variety of uses wherever animals are kept.

In order to avoid the chances of inoculation from the several acknowledged means, an outer garment as a frock or smock should be worn by the shepherd while attending to the diseased ewes, and when not in use regular fumigation ought to be applied as well as washing. The shepherd should also be instructed to wash his hands carefully in hot water with strong soap, and the safety of the plan will be very much enhanced if he anoint them well with some of the "antiseptic mixture" before the washing. He should also cover his hands with it before attending to a second ewe. The birth-passage through-

out may be dressed with the "mixture" by soft tow or cotton wool thoroughly saturated and carefully conveyed by the hand, and by means of a suitable syringe (Fig. 350) a portion should be injected into the womb.* The dressing of the vagina and external organs should be carried out several times during the day; the injections for the womb at least twice.

In addition to this principle of treatment, measures of a constitutional character must be adopted. It is necessary to pay attention to the state of the bowels, to administer stimulants when depression is evident, and the neutral salts also may be called for. Disinfectants should be freely applied to the ground, bedding, &c., on which the animals are folded, and accumulations of fæces, &c., must be avoided as far as possible. Isolation of diseased from the healthy will be of great advantage, as preventing the risk of inoculation.

The use of antiseptics in this disease has been extolled during two or three years as a new discovery. It is common to see individuals strutting about in borrowed plumes which ill adorn them, and thus quackery endeavours to outshine the legitimate practice of medicine. The treatment of all similar affections by antiseptic remedies is *not* of recent date; it has not reached the sheepfold as soon as it might, because druggists instead of veterinarians were consulted.

3. Red Water in Sheep and Lambs: *Sanguineous ascites;* in the vernacular, *Water-bellied. Pourriture aigue, Maladie rouge,* or *Maladie-de-sologne* of the French; *Diarrhœmia* of Delafond.

Nature.—Blood disease, a result of an inordinate plethora, characterized by an extensive effusion of fluid within the abdomen, which results in sudden death. It is a common result of high feeding after scanty keep or inferior food when the ewe is pregnant. Animals suffering from this malady are said to be "wet" by the butcher.

* This instrument is expressly manufactured by Messrs. Arnold and Sons, 35 West Smithfield.

Symptoms.—Few of the leading signs are noticed, as from their rapid development animals are attacked and found dead within a few hours. Where, however, opportunities have occurred favouring observation, they have been as follows: appetite and rumination suspended; the animal is dull, and moves with great disinclination, and frequently reels in suffering from being giddy (vertigo). The eyes are staring and the pupils dilated; more or less blindness is present, and the head is frequently carried to one side. Constipation is severe, and other secretions are checked.

Post mortem Appearances.—Blood-vessels beneath the skin, and over the body generally are congested; ecchymosis is present throughout; but the most remarkable sign is the presence of a great amount of red serum in the cavity of the abdomen. The liver is dark coloured and congested; the spleen is also enlarged. Biliary ducts, gall bladder, and gall duct are full of bile; and the blood-vessels are distended. The effusion also extends to the pleural cavity, and occasionally the heart is enlarged. This affection is sometimes confounded with ordinary ascites (dropsy) of the abdomen, and the ascites of rot. The presence of ecchymosed spots, congestion, and colour of the effused serum are, however, infallible distinctive signs.

Treatment.—The general principles are to be adopted as recommended for "Braxy."

4. Blood Disease of Lambs — Pyæmia Agnorum — commonly known as *Navel-ill.*

Nature.—A blood disease resembling braxy in older animals, characterized by a similar stagnation and rapid coagulation of the blood within the vessels, attended with local tumefactions beneath the skin.

Symptoms.—Great prostration and staggering, eyes dull and bloodshot, mouth red and congested. The animal pants and lies persistently, having no inclination to move, but, if lifted

up, will attempt to suck. The pulse is small or imperceptible, fæces and urine are deficient, and swellings appear on various parts of the body, as the umbilicus or navel, the hind quarters,

FIG. 51.

beneath the jaws, or upon the throat, &c., which are soft and fluctuating, containing a yellow gelatinous fluid. Death is rapid.

Mortality in connection with this disease is sometimes needlessly increased by allowing adopted lambs to wear too long the fleece of one dead, producing blood poisoning, described under Apnœa, page 67.

Post mortem Appearances.—The body exhibits every indication of being in a thriving condition, but the tissues are yellow, the whole of the blood-vessels throughout are congested, and the contents dark and fluid. The liver is enlarged, congested, and contains numerous abscesses. General ecchymosis also occurs over the serous membranes of the closed cavities as the chest, abdomen, &c.

Treatment consists of general principles as already directed under "Braxy," and which follow in a general summary.

General Treatment and Prevention of Enzoötic Diseases.

Our consideration of this subject will be directed, in the first instance, to those forms of anthrax which depend generally upon mode of management and diet; and next, to those arising from other causes, as character of land, inoculation, &c.

It is a remarkable fact that anthrax diseases are common to all parts of the country, and it was formerly thought that grain and crops removed from one kind of soil, and supplied to animals at some distance, possessed the cause in some form or other. It is, however, now generally admitted that in those victims to the complaint which are not at large, the direct cause is a poisonous condition of the blood, due to the presence of an enormous amount of pabulum not sufficiently elaborated. The consumption of large quantities of rich food during inactivity is likely to furnish this; and, besides, the assimilative functions being unduly taxed, become feeble, the nutritious elements of food are rapidly passed into the circulation before they are capable of being converted to the wants of the body. They are in excess, and unappropriated, while the depurating organs, lacking also the necessary stimulus—exercise—cannot remove them, because they too are already enfeebled by previous extra and constant demands. Such materials, or pabulum, by reason of its low degree of elaboration, probably undergoes a change. not unlike a ferment; they become a poison, and then we have all the elements necessary to develop one or other of the forms of disease already considered.

There is nothing so likely to give rise to these states as the practice of bad or uncertain kinds of feeding animals, young stock especially. We have known herds of young bullocks sent to winter quarters many miles distant, where, as a rule, they fare very well; but occasionally the reverse happens, and in the following spring, when taken home, they are in unusually low condition. The proprietor is hurt and disappointed; he seeks to set matters right by turning the animals into the "home pasture," where they will be under his "own eye," and

probably, as an extra impulse of kindness, he allows a good feed of oil-cake, or plenty of grain, meal, and chaff, &c. Such measures are the very worst for the welfare of the animal, but the most effective to bring about the states we wish to avoid. Young growing and thriving stock should have regular food, both as to quality and quantity, as far as possible; the use of artificial foods and grain should be commenced, in many instances, much earlier, so as to prevent the sudden fall in condition and loss of vital power; and when animals have been reduced from any cause, their removal to richer pastures, or the supply of better food, should be directed with caution. Home pastures, usually rich from heavy manuring, should either be totally avoided, or the grazing limited to a few hours, after which the animals will be all the better for a long walk to a bare pasture, where they may have to work during the remainder of the day for their living. Medicines are of great importance. It is too frequently believed they are not absolutely required. These, with proper exercise, and *moderate* allowances of food, are the true safeguards.

Older animals bear the effects of confinement and rich food differently, but the results are analogous. These are often painfully evident after periods of semi-starvation on poor pastures during cold weather, but they are readily avoided by the exercise of judgment and caution in the changes in food, locality, pasturage, &c. It may be advisable also in these cases to make a somewhat extensive use of medicines, to bleed and purge probably in the first instance, and subsequently for a few weeks, to counteract the tendency to excessive plethora, by regular doses, two or three times weekly, of some neutral salt, with which iron, gentian, ginger, &c., may be combined. For these cases it will be advisable, when possible, to consult the nearest veterinary surgeon, as certain exceptions have to be considered in reference to in-calf-cows and other animals, for which a general plan of treatment may not be suitable.

It is not improbable that some form of animal poison directly introduced to the circulation may frequently be the cause of widespread outbreaks of charbonous or anthrax diseases. Soils

having a rich alluvial deposit, and home pastures heavily manured frequently produce crops strongly saturated with manurial elements, and the result is a morbid ferment carried into the blood induces disease of a virulent and rapid type. The prevalence also of such diseases insures the poisoning of bedding and pastures with the analogous germs of contagion so to speak, as they are spread abroad by urine and fæces ; in addition the careless slaughter and imperfect burial of carcases, partial exhumation by dogs, and other means, giving rise to the spreading of morbific matter, which gains access to the system by means of water or food, and works irreparable mischief. In this way, after the cattle plague had somewhat subsided in 1866, gloss-anthrax, splenic apoplexy, purpura-hæmorrhagica, and virulent blood-poisoning in various animals followed, in almost all cases, as in others constantly happening to the present day, the careless disposal and interment of the flesh has been found to be the cause.* With the view of effectually putting a stop to these untoward results, we should like to see the practice of burning the carcases universally carried out.

In these forms of anthrax, all kinds of treatment have hitherto proved abortive ; indeed, the rapidity with which the disease always runs its course often forbids the attempt to cure. The plan indicated by general circumstances is to combat the tendency to prostration by alcoholic stimulants, such as the ethers ; bleeding and gentle movement of the bowels may also

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* The following extract from *The Farmer* of August 16th, 1880, having a direct bearing on this question, will be read with interest :—

"SPREAD OF DISEASE BY THE AGENCY OF EARTHWORMS.—Recent researches by M. Pasteur appear to throw considerable light on the origin of anthrax, or splenic fever, and allied diseases, which attack cattle, sheep, &c. When an animal dies of anthrax it is not uncommonly buried on the spot. The conditions of putrefaction prove fatal to the small parasitic organism, or *bacteridium*, which is abundant in the blood at death. The gas given off causes it to break up into dead and harmless granulations. But before this can occur not a little of the blood and humours of the body has escaped into the ground about the carcase, and here the parasite is in an aerated medium favourable to the formation of germs. These corpuscular germs M. Pasteur has found in the soil, in a state of latent life months and years after the carcase was buried ; and by inoculation of guinea pigs with them has produced anthrax and death. Now, it is specially notable that such germs have been met with in the earth at the surface above the place of burial, as well as near the body. The question arises, How came they there? And it would

be warranted, followed by the use of the neutral salts; but as in all such excessive cases, the advice of a veterinary surgeon should be obtained, and to him must be left the carrying out of specific details. In no case is the truth of the proverb, "prevention is better than cure" so forcibly apparent as in the devastation produced by the indigenous diseases, called anthrax, of Great Britain.

Before concluding this part of our subject, we feel it extremely imperative to point out the absolute danger attending the flaying and cutting up of the carcases. This applies most particularly to splenic apoplexy, gloss-anthrax, malignant sore throat, and the inveterate forms of complicated blood poisons which these diseases may sometimes assume. A cut with the knife used, or a scratch from a splintered bone, tooth, &c., is not always required to ensure awkward consequences, for frequently drops of the poisoned blood, falling on the bare arm or cheek, have produced the most agonizing death in the human subject. And as to the consumption of the flesh as food, it is well known that, in some forms of anthrax, the poison is destroyed in the cooking. There is no doubt that thousands of animals affected with braxy, black quarter, parturient fever, &c., are more or less consumed as food; in other forms of anthrax this is not so, as the flesh is often putrid before death. These facts, as they stand, point to the great necessity for the adoption of such means as will secure the farmer against actual loss, practically making it not worth the

appear that earthworms are the agents of conveyance. In the small earth-cylinders, of fine particles, which these creatures bring to the surface and deposit after the dews of morning or after rain, one finds, besides a host of other germs, the germs of anthrax. (The same process was proved also by direct experiment; worms kept in ground with which *bacteridium* spores had been mixed were killed after a few days, and many of the spores were found in the earth-cylinders in their intestines.) The dust of this earth, after the cylinders have been disaggregated by rain, gets blown about on the neighbouring plants, and the animals eating these thus receive the germs into their system. It is suggested that possibly other diseased germs, not less harmless to worms, but ready to cause disease in the proper animals, may be in like manner conveyed to the surface in cemeteries. This would furnish a fresh argument for cremation. The practical inference as to anthrax is, that animals which have died of this should not be buried in fields devoted to crops or pasturage, but (wherever possible) in sandy, calcareous ground, poor and dry—unsuitable, in a word, for worms."

trouble to dispose of the carcases of animals "killed to save their lives." The time will surely come when the prevention of live stock diseases will form the almost entire care and occupation of the veterinary surgeon in our agricultural and breeding districts. It may be difficult at this stage to see how this may be brought about and generally adopted, but that objection does not, or should not, at least, put the matter farther from our consideration. The study of the question is conducive to the interests of all stock breeders, &c., for by no other means shall we be able to produce the amount of live stock as heretofore. The decimation of past years was caused by incurable diseases; the anchor of immunity, therefore, lies in our means of prevention, as all other action is false and ineffective, as far as foreign epizoötics and indigenous enzoötics are concerned.

One other point remains to be noticed—the provision of shelter. The depressing effects of cold are very great, and, when is added exposure to wet, the vital powers are seriously interfered with, and the foundation for all kinds of disease is laid. But, setting aside all this, the greater portion of food consumed during such exposure, instead of being laid up in the system as fat and flesh, is expended in a fruitless effort to keep the animal warm—it is almost, if not entirely, wasted, as at the end of the winter he is poor and lean, and months elapse before it is known whether he has actually recovered from the effects of the neglect. It is more highly probable that, as already stated, he perishes in the attempt to improve him by an allowance of better food, another phase of the principle of "killing with kindness."

IV.—BLOOD DISEASES ARISING FROM ANIMAL POISONS OF UNKNOWN ORIGIN, NOT INDIGENOUS TO BRITISH SOIL, HIGHLY CONTAGIOUS, AND PRODUCING BY INOCULATION* THE SAME DISEASES IN OTHER ANIMALS OF THE SAME SPECIES, CONSTITUTING THE CLASS EPIZOÖTIC DISEASES, viz.,

A.—RINDERPEST OR CATTLE PLAGUE
EPIZOÖTIC PLEURO-PNEUMONIA
EPIZOÖTIC APHTHA.

B.—VARIOLOUS FEVERS, partaking of the foregoing characters, except in their being chiefly sporadic, but occasionally epizoötic, viz.
SMALL-POX IN SHEEP.
COW-POX.
CHICKEN-POX.

EPIZOÖTIC OR CONTAGIOUS DISEASES OF CATTLE AND SHEEP.

It is not generally known, but is a subject of congratulation to the British stock-owner, that our unparalelled herds of cattle are not subject to fatal contagious diseases indigenous to our soil; or, more plainly, there are no instances on record, nor within the memory of the oldest and wisest farmer or other person interested in the welfare of cattle, that prove the existence of fatal contagious diseases among them, arising spontaneously and in consequence of the nature of our soil, climate, mode of management, or any other cause. The only known

* See foot note, page 55.

indigenous contagious disease among bovine animals, and that as a rule very mild, and by no means fatal in its nature, is the *variola vaccina*, or cow-pox, common under certain conditions to the large dairy stock of Gloucestershire, Vale of Aylesbury, and other similar large districts. Several diseases that occur with certainty and regularity each year are pronounced contagious in character, but facts are not wanting to prove the incorrectness of the reasoning.

The maladies we first have to consider are those well-known contagious diseases, recognized by veterinarians as foreign epizoötics, viz.: *Rinderpest*, or the Cattle Plague; *Epizoötic Pleuro-Pneumonia*, or the Lung Complaint; and *Epizoötic Aphtha*, or Foot and Mouth Disease. Our notice will extend principally to their proved contagious nature, and the method which should be adopted in order to reduce their devastating properties, as well as prevent their future introduction.

With regard to the contagious nature of these maladies, notwithstanding the lamentable evidences which were witnessed recently in connection with cattle plague—earlier from pleuro-pneumonia, and more remotely and indirectly from aphtha—there are yet individuals to be found who not only deny it, but exert their influence politically, privately, publicly, directly, and indirectly, to prevent others believing such, and do all they can to impede action in the matter of eradication and suppression. Other persons also contribute to form a sect, who, admitting the contagious nature of the diseases in question, positively assert there is nothing foreign about them, and the farmers alone are responsible for their appearance in the filth and dirt which is allowed to accumulate on their premises.

We fully admit the title of every man to an opinion, and accord him honour in proportion to its weight and value; but we must urge no reasoning is so shallow as that which decides the non-contagious and indigenous nature of the diseases already named. In short, such opinions are not the result of close observation; they are not the fruits of an intimate acquaintance with the action and progress of disease; there has been no study in the question; truly, they are mere assertions,

having no support by facts or evidence of any kind, but usually party cries and political gags intended to attract attention in one quarter, while the siege is directed in another. Divest the subject of the fetters that hang around it at the present; let it become a *national* question, and the sophistry will be discovered and separated; maintain it as a question of party, and the stock-owner and consumer of Britain may groan and continue to pay fabulous prices for a staple article of food which should reach us for a comparative trifle.

History.—The contagious diseases of cattle and sheep, as far as Britain is concerned, have been known but very recently; but on the Continent of Europe, and in certain parts of Asia, they have prevailed for centuries. Years before they visited our shores, those Eastern countries suffered from periodical invasions which swept away their cattle like chaff before the wind. For fourteen hundred years the unconnected history of their ravages is before us, and scarcely a nation exists abroad that has not lamented the movement of armies through their territories, with plague-stricken animals as beasts of burden among them. From the days of Theodosius and Charlemagne to the present, vast havoc has been committed. Since the year 817 they have decimated Illyria, northern Italy, France, and Belgium, and when banished therefrom, have spread by similar means to Hungary, where an equal devastation occurred; and thus the combined scourge passed from nation to nation, following, like grim death, in the wake of revolutionary armies for four hundred years, when we find our history at the period of 1223. Indefinite records again fail to give particulars of more than one serious outbreak between that period and 1625; but it is clear that, as in our day, the several diseases raged side by side, rinderpest, however, being prominent in the scourge. It then appeared in the north of Italy, and extended along the banks of the Po, entered Padua and Venice. From 1709 to 1717 it again raged with violence. Tartary, Muscovy, Poland, Bessarabia, Croatia, Dalmatia, Upper Italy, France, Hungary, Germany, and Switzerland were invaded, and from thence it spread northwards to Silesia and the Baltic. In the

kingdom of Naples 70,000 cattle perished; many thousands also in Silesia. In Holland alone not less than 200,000 fell victims; and in Europe it is estimated that 1,500,000 animals were sacrificed. In 1713 cattle plague was brought to England, but was arrested in the counties of Essex, Surrey, and Middlesex by the slaughter of 6,000 cattle.

From 1713 to 1730 it was characterized by periodical outbreaks here and there. By the wars of the period it was roused into activity, and again rapidly spread over the greater part of Europe; Hungary, Bohemia, and Germany being almost laid waste. In 1745 Holland was again almost decimated, and from thence it came to England, and for twelve years, under a less careful direction, it continued to devastate our herds. Two years afterwards Government took up the matter in earnest, and ordered every animal, however slightly affected, to be at once destroyed, compensation being made to the owner; therefore, in the third year 80,000 cattle were slaughtered, and double that number is said to have died of the disease. In the fourth year they were destroyed at the rate of 7,000 per month in order to arrest its progress; but false representations leading to numerous impositions were so frequent and shameless, that the restrictions were for a time withdrawn, and without let and hindrance it once more pursued its ravages almost unmolested. In Nottinghamshire and Leicestershire, during 1747, no less than 40,000 cattle died, and Cheshire lost 30,000 during six months of that year. For thirty years it continued to hang over Europe; and it is computed that upwards of 30,000,000 of cattle perished. In 1770 Holland again lost a great number of cattle from the plague, no less than 375,441 being sacrificed. From thence it passed into Picardy, and destroyed 11,000, and returned again with renewed vigour to Holland in 1773, and devastated also Flanders, Picardy, and neighbouring countries.

It followed Napoleon and his army into Italy; and in 1793-94-95 from three to four millions of cattle perished in Piedmont alone. It was carried to the Rhine provinces; thence to Switzerland in 1796, and found its way back, in the wake of

the Imperial presence, to the very gates of Paris, not less than 12,000,000 *f.* representing the value of 130,000 animals which died in France only, while 11,047 were sacrificed in the Rhine provinces. From 1792 to 1815 wars with Russia and other countries were constant, and the pestilence again appeared, Austria, Bohemia, Saxony, Prussia, Poland, Hungary, Silesia, and France being again the sufferers. In 1827 the Russo-Turkish wars were the cause of another outbreak of the disease in Bessarabia, Wallachia, Moldavia, Podolia, Volhynia, Prussia, Saxony, Hungary, and Austria. In 1830 it again appeared in Illyria, being conveyed from Austria.

In 1842 it was conveyed to Egypt and Nubia, 300,000 head of cattle dying therefrom. In 1843 it broke out again, when 35,000 died; and, upon a third invasion, 15,000 died—or, in all, 350,000 cattle were sacrificed. In 1844 the countries bordering upon Russia were threatened, and in 1850 Austria was invaded for the ninth time within the present century. During 1852-53 it was principally confined to Russia, where great losses occurred. In 1854 it spread over a vast area of European territory, Austria, Poland, and Germany again suffering greatly. We there hear of it as affecting the cattle of our armies during the Crimean campaign, and also of its passing into Poland, Austria, and Prussia. Our next experience occurs at our own doors during 1865-66-67. But we need not write its further history: that is already compiled in form of an indelible character, and will only be read with interest by a succeeding generation. From England it was conveyed to Holland and France, and, notwithstanding that most stringent measures have been exercised, practices of a surreptitious character have been the means of prolonging its visitation, and disseminating the sad influences to various parts of the Continent.*

* The looseness with which these matters are treated on some parts of the Continent is fully set forth in the following paragraph, taken from *The Farmer*, of October 28th, 1878. Such wretched management might not be worth notice, or call for the least comment from us; but seeing that these countries look upon us as creating the great demand for their animals, we have a right to see that they supply us with healthy ones —not only sound in carcase, but also *clean, and free from infection*:—

RINDERPEST IN ROUMANIA.—The extension of cattle plague throughout Roumania

These remarks apply not only to Cattle Plague; they have also special reference to pleuro-pneumonia and aphtha. These diseases, having one common home and origin, have generally prevailed simultaneously, thus tending to render those with which they were associated still more deadly. As a rule, the animals have first suffered from foot and mouth disease (aphtha), and after the system has been reduced and rendered more prone to attacks from disease, they fell victims to pleuro-pneumonia, and even subsequently also to Cattle Plague. Thus in the camps three affections prevailed; and this occurred also in Britain recently, a fact which, doubtless, acted as a great addition to the cause of mortality.

But the advent of peace, resulting from a cessation of war and tumult among nations given more to warfare and predatory pursuits than to agriculture and industry generally, did not bring about such a mitigation of contagious diseases as would be supposed would be the result of a removal of the causes we have named as being all-powerful. Holland, Germany, parts of Austria and Prussia, Belgium, France, &c., represented the most industrial nations, and, after being swept of their supplies of animal food, turned their attention more vigorously to the creation of other sources of remuneration for their labour. Land was abundantly sown with corn, and this was used for the manufacture of starch and distillation of spirits; but they found that a great deal of refuse grain was

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has recently become so general that the Hungarian Ministry of Agriculture found it necessary to despatch thither an official of high rank, to inquire into the real condition of affairs and devise means to prevent a further spread of the evil. The report of this gentleman gives a curious idea of the capacity of Roumania for self-government. He confirms the assertion already advanced that the plague prevails in all districts, and states that anything like isolation, disinfection, compulsory slaughter, or indeed any protective or preventive measures whatever, are absolutely unheard of. The carcases of animals that have succumbed to the disease are skinned, and the bodies left lying in the roads or fields, or perhaps even thrown into the streams or ponds from which the other cattle drink. Diseased beasts are pastured along with sound ones; cattle markets are held just as usual, whether rinderpest be raging in the locality or not, and transport of live stock by rail is carried on without the least supervision or control. No wonder that on the reception of such a report the Hungarian Agricultural Ministry hastened to devise and enforce regulations for the protection of the frontier against the entry of stock from Roumania.

the result of the processes, and therefore cattle were again in demand for its consumption. At this stage, a dependent trade sprang up—the dealing in cattle for supplying the distilleries, the few cattle left as a remnant of the previous havoc being speedily swallowed in the new request. The countries thus engaged were unable to supply the demand, and neighbouring States were invited to exchange their stock for the gold of the industrious. Gradually the supplies grew short, and the cattle of the East were driven to the countries of the West, and as each State was drained, the dealers penetrated the Steppes and pestiferous districts, and again brought out their characteristic maladies, and the process, with little variation, continues to the present day. Our trade and connections with Holland, who supplies herself from many of these pest-ridden countries, therefore, renders the trade in animals a constant source of fear, and the introduction of Cattle Plague, pleuro-pneumonia, aphtha, and small-pox is as likely to occur again as before. It is a mistake to suppose that all animals coming from Holland are Dutch cattle: they are collected from Austria, Silesia, Prussia, &c., which in turn collect them from the home of the plagues; and a process of smuggling also insures the entrance of fell disease in the face of Government enactments and stringent *cordons militaire.* Constant introduction of disease to a country keeps alive the activity of the virus. It is unaffected by heat, cold, or moisture, and at length the places become stations from which the scourges are never absent. Such is the condition to which Britain is now reduced with regard to pleuro-pneumonia and aphtha, and a little more would secure it in favour of Cattle Plague and small-pox. The blundering legislation of Government; their tendency to act on unreliable information; to admit a species of quackery instead of scientific advice; to place the administrative power and investigation of the maladies in foreign hands instead of the legitimate profession, stand as a perpetual monument to the disgrace of a British Parliament. A mere handful of men fully qualified to suppress the plagues and satisfy an injured public, were scorned and rebuked. History

and experience went for nothing. The sayings and doings of a "Circumlocution Office" were the order of the day; and the public groaned, suffered, and were compelled to pay for the troubles imposed upon them.

The Nature and Peculiarity of Epizoötic or Contagious Diseases.—The contagious diseases of cattle are, fortunately, marked by peculiarities, which, as a rule, are readily distinguished. They are in this country the only true epizoötic affections, or, as we indicate by the term, wide-spread, seizing large numbers of animals distributed over a vast area of country or district. It is useful to be able to decide accurately from the characters exhibited whether a disease belongs to the contagious class or not; it is easy to be led into the belief that it is contagious, and from this circumstance a considerable amount of alarm may ensue, which will also exhaust the patient energies of those better informed in an attempt to restore calmness and comfort. As already stated, all our contagious diseases of cattle and sheep are epizoötics; but, on the other hand, all diseases which assume the peculiarities of an epizoötic, are not necessarily contagious. Thus, several of the anthrax diseases appear from time to time as epizoötics, affecting animals in great numbers and with extreme fatality; but we have yet failed to distinguish such peculiarities by which they may be termed contagious in the true sense. Then there are various forms of indigestion, catarrhs, ophthalmia, &c., which prevail largely and even seriously, when we say they are epizoötic, that is wide-spread; but we forbear even hinting that they are contagious. One great difficulty arises in connection with some diseases, and many, even veterinarians, fail to overcome it in an endeavour to pronounce correctly as to the nature; this is in reference to inoculation. Certain of the anthrax poisons are communicated by the blood, &c., of diseased animals to others; the excretions also convey the same poison; but by these characters alone we cannot be justified in pronouncing the disease contagious, only in a limited sense. The same kind of reasoning occurs in reference to other maladies not communicated by inoculation; the fact of their prevailing

largely is the usually alleged proof of contagion. The character or nature of a disease may be considerably modified by outward circumstances, and, we believe, this fact has not received the attention it deserves. Thus, the original cause of the complaint may, from surrounding circumstances, as heat, drought, or moisture, or all combined, be multiplied indefinitely, and, carried about by the wind, cause immense havoc. Such a disease we may be able to propagate by inoculation, but the prevalence of it over a district is not essentially due to inoculation, but, as we believe, to a vast multiplication of the poison germs which are received into the body by the food, or respiration. Then, again, many blood diseases arise from the combined influences of an atmospheric character, aided by the peculiarities of food, mode of housing, domestication, &c. They are often wide-spread, and although not communicable by inoculation, yet all in the same building may suffer more or less. Setting aside the fact in relation to inoculation in the first instance, there is no real difference in the two cases, as both unfortunately arise in the natural order of things from the effects of multiplied causes only. Thus, with influenza and strangles in horses, and canine distemper, the multiplied causes are found close at hand, they produce only influenza, strangles, or canine distemper; and our experience of these diseases is, that when other animals, incapable of being affected in the usual way, are closely confined in stables, &c., where suffering animals abound, they contract a blood poison of different character altogether. During the year 1879 a rivalry was excited among learned veterinarians as to the decidedly contagious nature of hog-cholera, and canine distemper, in the latter instance reviving the antiquated notion of Blaine, that it was imported to us from the Continent. With regard to the spread of hog-cholera, it may not be uninteresting to note that it is very probably largely due to the habit of the animal to search in all kinds of putridity; and its more than ordinary prevalence of late years, to the existence of epizootic disease among cattle, whereby large quantities of blood offal, and other decaying animal remains, by imperfect burial have been allowed to con-

taminate drains, water courses, ponds, &c. By the same means anthrax among cattle and sheep, and a virulent form of blood poison, or purpura-hæmorrhagica in horses, have prevailed of late to a most unusual and fatal extent. As to canine distemper we would only add, that years ago all attempts at conveying the disease by inoculation failed in the hands of that profound teacher of veterinary science, John Barlow; the experiments, in which we assisted, being conducted as carefully as possible, and with every desire to test the possibility of the existence of a "virus" in the discharges, &c. Instead of canine distemper arising from the introduction of mucus, &c., the results of mild inoculation were *nil*, and when large quantities were used a severe form of blood-poisoning ensued, setting at rest, as we believed, the non-contagious nature of the affection. While holding these views, and educated in them by circumstances as they have been presented to us, we shall be among the first to hail the advent of all reliable information in reference to these unsettled points.

We now turn to a consideration of the special characters which distinguish the contagious affections from the foregoing. They are remarkable in having a period of incubation, or latency; in other words, a healthy animal brought into contact with one diseased will not exhibit the signs characteristic of the malady until the expiration of a certain number of days. This period has been fairly well ascertained, and proves a safe means by which animals can be isolated, and the ravages of the disease controlled or limited.

The next is an important feature. Owing to the period of incubation necessary for the "virus" to establish itself, the attacks are *always insidious and in succession*, and the plague, whatever it may be, goes on for months and even years, as long as animals are present. When simple diseases, under aggravated or multiplied causes become epizoötic, the attacks are *sudden and always simultaneous*, and may be referred to some largely prevailing state of wind, weather, or the specific poison. Contagious diseases are not affected by temperature or climate, as far as their suppression or mitigation are concerned; they pre-

vail as well in winter as in summer. This is also the reverse of ordinary diseases becoming epizoötic. Inoculation by blood, mucus, serum, &c., of contagious diseases communicates the true malady in all cases but that of pleuro-pneumonia. In this exception the disease resembles the poison of anthrax.

Contagious diseases rarely affect the same animal twice; but common or enzoötic affections may repeatedly do so.

Medical treatment and removal of all causes of ordinary diseases produce no mitigation or cure of the contagious maladies; *they are really incurable*, run through a prescribed course, and are fatal to the extent of fifty or even ninety per cent. in some instances, or, as in milder cases, they leave the animal entirely worthless. Enzoötic diseases becoming epizoötic do not exhibit these characters. Medicines assist, and even cure; removal of causes arrest the disease; they are fatal only in few instances, which are rapid, and generally take place within a few hours after the attack; but animals recovering become, apparently, as well and useful as before. Further information will be found under the head of sporadic pleuro-pneumonia, where the peculiar characters of the contagious form are given in contrast with the non-contagious disease.

1. The Steppe Disease: *Russian Cattle Plague, Contagious Typhoid Fever of Cattle, Typhus Contagiosus Boum, Pestilential Fever, Rinderpest.*

Nature.—Cattle plague is a highly contagious fever, attended with inflammation and specific lesions in the alimentary canal, which correspond remarkably with those of typhoid or enteric fever of man. In consequence of an unusually impacted condition being observed in the contents of the third stomach of animals that succumb to this affection, the term *löserdürre* has been applied to it by older writers, and even respected celebrities of our day have contended that this state constituted the real affection. But this condition is not peculiar to cattle plague: as in the majority of instances where disease

of a non-contagious character terminates fatally, distension of the omasum, by a collection of dry solid food, is not at all uncommon.

Symptoms.—A period of incubation, during which no appreciable signs of disease are manifest, always precedes this in common with all epizoötic affections. This may vary from four to fourteen days, but it has been known to terminate as early as twenty-four hours.

We understand the period of incubation to be that period of time which elapses between actual contact of healthy animals with others that are diseased, and the first manifestation of the characteristic signs. It is that period in which the virus of the affection, introduced within the system, multiplies and acquires that power and malignity only to be observed in contagious maladies. It is a period, too, during which an inconceivable mischief is executed without any outward indication, and baffles all skill to recognize. It is a period also in which

FIG. 52.—*Rinderpest.*

the fate of animals in close proximity is almost certain to be doomed, and among which it spreads with alarming rapidity.

Dulness and prostration of strength, a husky cough, and slightly staring coat are among the earliest symptoms; usually a shivering-fit may be observed at the outset. In many cases the *first stage* is altogether indefinite, and with the shivering-fit commences the *second stage*. Under ordinary circumstances, but a brief period exists between them and the development of high fever and catarrhal symptoms. The mucous membranes are the seat of the affection, from which purulent discharges flow most copiously. The appetite and rumination,

with the secretion of milk, are suspended or totally arrested. The grating of the teeth is incessant; an eruption forms upon the tongue, lips, and membrane of the mouth, and a copious salivation follows. The pulse is frequent and full, breathing laboured, bowels constipated, urine scanty; a painful cough and intense thirst render the sufferer very uneasy; the back is arched (Fig. 52), loins tender, movements stiff, skin dry and harsh. The temperature of the body is very variable. In the *third and last stages* the eruptions are observed to have spread

FIG. 53.—*Rinderpest.*

over the nose (Fig. 53), and extend to the clefts between the feet; but more usually they have burst and left behind a number of unhealthy-looking erosions or ulcers, the membranes assuming a purple appearance. Abdominal pains succeed each other rapidly, and are tolerably persistent; nervous twitchings over the body are observed, and a violent and offensive diarrhœa succeeds an apparently obstinate constipation; the skin is detached in places from the subjacent tissues, and the spaces being occupied by air (*emphysema*), as a result of decomposition, form large tumours over the body, especially the back and loins, and give rise to a crackling sound when the hand is passed over them. The vital powers are now prostrate; general emaciation progresses quickly; the pulse becomes

very frequent, small, feeble, or indistinct, and dissolution is rapidly approaching. Indeed, such is the progress of the affection that, in animals which die under its influence, putrefaction may be said to precede the departure of life.

Post mortem Appearances.—These are characteristic. The general evidence of emaciation is complete in all parts. Fœtid accumulations of gas are liberated when the abdomen is opened or intestines punctured, and the same escape from between muscles, beneath the skin, and the closed cavities. Large spots of extravased blood (ecchymosis) occur over various parts of the intestines, urinary and generative organs. The third stomach is usually impacted in consequence of the arrest placed upon digestion, and is frequently very much distended. In some cases the leaves of this organ are attacked by ulceration and even perforation; but these lesions are not special or confined to cattle plague.

The fourth stomach and small intestines are the seat of active inflammation, and beneath the lining mucous membrane profuse exudations of plastic lymph occur, which eventually determine a corresponding number of points around which ulceration commences. Beneath the lining membrane of the respiratory and circulatory organs (*pleura*), pericardium, and endocardium, patches of ecchymosis appear—undoubted evidences of a state of blood poisoning.

Treatment.—The most disappointing results occur from the treatment of this affection. All kinds of remedies in every variety of form have been tried, and in all instances the same ends were reached. Deaths occurred at the rate of 60, and even as high as 95 per cent., and animals that recovered formed the majority of those that received no medical aid whatever. Such is the nature of the disease, that we may state rapid destruction of tissues essential to life has proceeded beyond the possibility of being arrested by other remedies than the efforts of Nature herself, long before even observable signs are developed. The whole pharmacopœia of remedies has been ransacked, and likely, as well as most unlikely, prescriptions found favour during the serious excitement that ensued. The

quack, farrier, and cow-leech drove a "roaring" trade in the sale of their trashy medicines, and even added to their unblushing effrontery the testimony that their potions had cured hundreds. Officious inspectors, armed by a magistrate's warrant, galloped furiously on horseback from place to place, carrying a gun over the shoulder and powder in the flask, ready to practise with an instrument probably never before used by them, and certainly much out of place as forming one of their *chirurgicum armamentarium!*

Among the popular remedies was a mixture of assafœtida, garlic, &c., the odour of which was by no means inviting. It was based upon the recommendation of a Mr. Worms, who asserted he had cured animals affected with plague in the island of Ceylon. Such success, however, did not crown his asseverations and efforts in this country, as the animals died as fast as ever in spite of the remedy and Mr. Worms himself. Next in order came the vaccination remedy, out of which medical men were not above trying to turn an honest half-crown per head, and for this many forsook the higher animal, man, and became general vaccinators of bovine animals for the districts. Homœopathy also raised its voice, but succeeded no better; and all remedies, the gun included, assisted in the general spoliation of 1865-66, by which upwards of two and a half millions of money were riddled from the pockets of the agriculturalists!

Ample opportunities for studying the nature of the disease and effects of remedies were given by the Royal Commissioners, many of which came beneath the personal observation of the Author; and it is but a duty to acknowledge that the results were but the same which have been observed on the Continent years ago. His personal experience extends to the outbreak, as it occurred in and around the metropolis, as well as in many of the southern and midland counties of England. Throughout, and in every case, the disease gave unmistakable evidences of its only mode of propagation—that of contagion. It occurred in more instances than one, that the origin remained unexplained for some time; but the evidences we

possess of the subtlety of the poison leave no doubt as to the ready communicability, by the virus being conveyed in the clothes of persons, hay, straw, manure, offal ; animals, such as dogs, and even game, rats and mice in drains, probably also flies in hot seasons, and even atmospheric air. Such disorders, then, call for measures in advance of their observed effects; and the preservation of our home stock will depend upon the display of sound judgment, which can be gained only by a scientific estimate of their origin, effects, and mode of propagation. To attempt a cure is to put, as it were, a firebrand through the midst, and fan the flames of contagion, which only die out after the animals themselves are no longer living to be subject to their influences.

2. Epizoötic Pleuro-Pneumonia.

Synonyms.—Various terms are applied to this malady. In Britain it is known in different localities as the Lung Plague, Lung Complaint, Lung Disease, New Disease (in contradistinction to Aphtha or Foot and Mouth Disease), Epidemic or Demic, &c. Dr. E. Headlam Greenhow, in his "Report on Murrain in Horned Cattle" to Government in 1857, gave to it the name of "Pulmonary Murrain." Among the Germans it is known as "*Lungenseuche,*" *Peri-Pneumonia*, and *Exudativa contagiosa.* Delafond, a celebrated French writer, terms it "*Maladie de poitrine du gros Bétail,*" and adds "*Connue sous le nom Péri-pneumonie contagieuse.*" The Italians term it *Polmonea dei Bovini.*

Nature.—Like "Rinderpest," it is a highly contagious disease peculiar to the ox tribe, exhibiting no preference for the breed or age of cattle, nature of soil, climate, season, &c. By some writers it has been estimated a malignant fever, having local manifestations, which are extensive exudations of an inflammatory character, confined to the lungs and cavities adjoining those organs.

Epizoötic pleuro-pneumonia occurs in two forms: the appa-

rent, in which serious evidences of constitutional disturbance characterise the disease from the outset; and the latent, in which great difficulty exists in making a correct and satisfactory diagnosis during early stages of the complaint. This is also met with in many instances at later stages, owing to serious complications having proceeded insidiously, and giving rise to lesions which have advanced with such rapid and also insidious progress, that life in the suffering animal becomes a paradox.

Period of Incubation.—As in other contagious affections, we have in this an incubative stage, which may vary from two to six weeks; but, as a rule, about forty days are admitted to be the period that elapses before the local signs are manifest, and which has been found reliable data in practice. Cattle returning from fairs, or from localities where the disease prevails, have been known to show symptoms about the time named; and it has become a settled fact that during the first six weeks of the life of a cow within an infected town dairy, is the time in which the functions of health only are executed. Attempts have been made to prove that six months might elapse before the disease is developed. Such, however, we think, is impossible: the reasonable inference is that when animals are affected, and the known contact with diseased animals is so far removed, there must have been some other source of contagion.

The introduction of pleuro-pneumonia to Australia furnishes an apparent exception to the rule, similar to that just spoken of. Animals were taken from England—bulls for breeding purposes; three months were occupied on the voyage, and the disease broke out on their landing, and has never been eradicated since. It is doubtful if the bulls were infected prior to their being taken on board at a British port; but, what is probable, hay, straw, &c., may have been supplied to the ship from infected places, and thus contagion has been conveyed on shore in Australia by being first communicated to the animal during the voyage. The malady raged violently in Tasmania in 1864, and the Author was applied to by the authorities for

information, regarding its appearance in Britain, results of treatment, &c.*

From the statements furnished, it appears that the country has now become a station for the disease, and stringent measures only will succeed in banishing it.

How to Detect the Disease.—In order to detect the affection, a considerable acquaintance with the habits of healthy animals is requisite, together with close and frequent observation; and, added to this, no investigation can be complete without exercising a knowledge of auscultation, *i.e.*, a comparison and estimate of the various sounds that are heard during respiration in health and disease. This is ordinarily effected by applying the ear to the sides of the chest, and is greatly assisted by adopting percussion, or the means of eliciting sounds by tapping the sides with the knuckles or a special instrument termed a "pleximeter." In addition, the thermometer is of essential service, but its use at present has only been of a limited character. In all cases where the Author has employed it, the disease has not only been detected during its existence, but an elevation of temperature is found to precede the attack some days. Such an indication is of immense value in *all* the contagious diseases of cattle, as it enables the observer to single out those undergoing an incubative stage, and thus limit the spread of contagion. The thermometer bids fair to become an indispensable instrument in the detection of these diseases, and no examination of suspected animals can be perfect without it.

Symptoms.—During the period of incubation the animal is denominated "infected," and throughout may be observed a general improvement of condition and increase in the yield of milk, all of which are doubtless referable to the influence of the poison upon the blood and nervous centres.

The progress of the disease may be divided into three periods or stages.

First stage.—In this the signs are usually obscure and in-

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* The Report appeared in "The Hobart Town Advertiser." 24th July, 1865.

visible to the non-professional or unpractised person. They are mostly confined to an elevation of animal heat, as indicated by the thermometer, probably amounting to 103° or 104° F. There are also signs of disturbed respiration, and slight but unusual sounds in the bronchial tubes. The pulse is also raised in frequency, and the attendant may have observed a shivering fit. More rarely a cough or "husk" is noticed, with loss of appetite, hot mouth, dry muzzle, and suppressed secretion of milk. When these are observed at the outset of the disease it is likely to be rapid. In ordinary cases they mark the commencement of the following period.

Second stage.—This may not be entered upon during several days after the signs just enumerated have existed. The disturbance is now unmistakably that of a febrile character. The milk is decreased, mouth hot, breath rather tainted, mucous membranes injected, bowels constipated, the "husk," now ripened into a cough, is more frequent, hard, and persistent, as well as troublesome; the coat stares, the skin is yellow and scurfy, and successive fits of shivers intervene; the pulse becomes rapid and full, with a moderate degree of firmness, numbering eighty to a hundred beats. The activity, however, is but of slight duration, for it shortly becomes smaller, feeble, and not so distinct; a rapid and difficult breathing is observed, and the animal endeavours to facilitate the process by extending the nose and bringing the neck into a straight line, while pain is evinced in a low moan or grunt that accompanies each expiration. The elbows are also twisted outwards to relieve the chest from pressure, and movement is accompanied with pain and groans. When these signs are developed early there are fears of a rapid and fatal termination.

Further progress of the malady, which now may be said to have entered upon the *third stage*, is marked by dilated nostrils, the sides of which are moved extensively by the passage of air. A limpid discharge may be seen to flow from the eyes and nose, and not unusually it becomes of a purulent character. The extremities, as well as the horns and ears, are cold, urine scanty and high in colour, bowels still costive, mouth clammy;